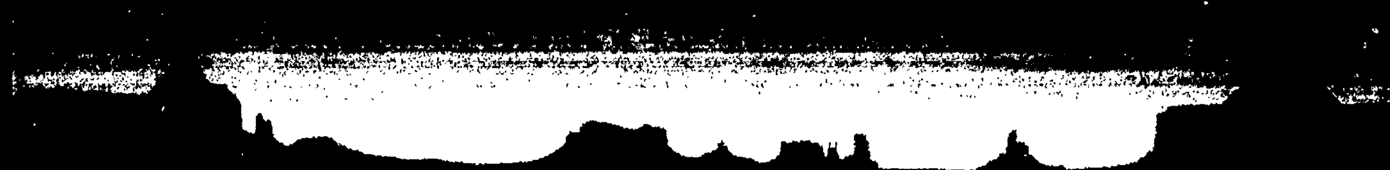
DOCUMENT RESUME

ED 355 949 IR 054 452

AUTHOR	Valauskas, Edward J., Ed.; Vaccaro, Bill, Ed.
TITLE	Macintoshed Libraries 5. Fifth Edition.
INSTITUTION	Apple Library Users Group, Cupertino, CA.
PUB DATE	92
NOTE	112p.; For the 1991 volume, see IR 054 451.
PUB TYPE	Collected Works - General (020) -- Reports - Descriptive (141)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	Academic Libraries; Computer Networks; *Computer Software; Elementary Secondary Education; Higher Education; *Hypermedia; Information Retrieval; Library Services; *Microcomputers; Online Searching; Public Libraries; Reference Services; School Libraries; Special Libraries; Staff Development
IDENTIFIERS	*Apple Macintosh; HyperCard; Screen Format; Vendors

ABSTRACT

This annual collection contains 16 papers about the use of Macintosh computers in libraries which include: "New Horizons in Library Training: Using HyperCard for Computer-Based Staff Training" (Pauline S. Bayne and Joe C. Rader); "Get a Closet!" (Ron Berntson); "Current Periodicals: Subject Access the Mac Way" (Constance L. Foster); "Project ilLUMINAte at the University of Minnesota Libraries" (Celia Hales-Mabry); "Pat: Got the Apple Grant! Help!!!" (Pat Hunt); "A Teacher's Dream...A Student's Nightmare: The Minnesota State Test Item Bank on CD-ROM" (Keith Johnson); "The Chemist's Crystal Ball" (Merri Beth Lavagnino and Kimberly Parker); "Macintosh in a Supercomputer Library" (Mary Layman); "The Library is Not a Place" (Shelley Lochhead and Lawrence Bickford); "Profiting From the Macintosh: Investments in an Electronic Library at Southwest Missouri State University" (John M. Meador, Jr.); "Digitized Document Transmission Using HyperCard" (Eric Lease Morgan and Tracy M. Casorso); "Designing and Evaluating ARCHIMEDES: A HyperCard Reference Aid at the University of Michigan" (Jim Ottaviani and James E. Alloway); "The Gateway to Information: Using Macintosh, HyperCard and MitemView to Simplify Information Seeking at The Ohio State University" (Fred Roecker); "School Libraries and Smart School Development" (Charles Stallard); "HyperCard VIRGO Training" (Christie Stephenson); and "The CORE Project: Formatting Chemistry Information for Screen Display in HyperCard" (Stuart Weibel, Mark Bendig and Will Ray). Also included are an introduction, "The Death of the Library Workstation" (Edward J. Valauskas); a directory of vendors; an index; and a list of the hardware, software, text types, and outputs used in the publication of this collection. (ALF)



edited by Edward J. Valauskas & Bill Vaccaro

10381 Bandley Drive
Cupertino, CA 95014.

Fifth edition.

Page design and cover graphics by Bill Vaccaro.

General Index and Vendor Index compiled by Edward J. Valauskas.

Special thanks to Monica Ertel, Nancy John, and Patricia Tegler for their help in the making of this publication.

Also available as a *HyperCard* stack.

Macintoshed Libraries 5

edited by
Edward J. Valauskas & Bill Vaccaro

APPLE LIBRARY USERS GROUP
CUPERTINO, CALIFORNIA

Dedicated to James Marshall Hendricks (1942-1970) for demonstrating that time respects genius. We'll meet you in another place so don't be late.

Table of Contents

Introduction:

The Death of the Library Workstation

Once upon a time, in the not too distant past, librarians wished that their libraries worked like toasters. Toasters. An electrical appliance to — guess what? — toast bread.[1] Since they never could make their libraries work like toasters, they really wanted their computers to operate like toasters. A patron walks in, approaches the computer – excuse me, the Library Workstation – hits a few keys, and Bingo! up pops the Information. Fortunately, for all of us, the Library Toaster — I mean the Library Workstation — has become extinct. Libraries are complicated places. Information is complex,

Edward J. Valauskas

ephemeral, variegated and even perverse. Patrons do not seek toast — thank goodness! — from librarians and their tools, but instead assistance in finding papers, books, software, photographs, recordings – almost any intellectual product. In a world where information disposal (42% of all trade paperbacks end up in landfills) is as much as a problem as information access, Library Workstations — one-trick appliances like toasters — never had much of a chance in answering the needs of both librarians and patrons.[2]

Part of the fascination in creating a Library Toaster was that we could have all of information in one place on one machine. A virtual library right in front of us. Walk right in, and have the Toaster butter up *Moby Dick* for you, in some pre-digested, easily assimilated form, of course. Library Toasters on this sort of scale require lots of storage, but not at the expense of filling the Reading Room with air conditioned metal, silicon and plastic cabinets. Other industries, beyond libraries, were well down the road in providing huge amounts of information rigged in desktop-sized boxes. For example, airlines had to deal with a question of transporting manuals or passengers — but not both. Each airplane needs its own informational luggage amounting to thousands of pages of manuals, hundreds of charts, pages and pages of maintenance records and reams of weather charts. Enter electronic library systems. These devices manage more than five gigabytes of data, updatable every time the plane parks at a gate.[3] Here was the answer for libraries. Right? Wrong. Unfortunately for those would-be inventors of Library Toasters, information for libraries is not as concentrated — as immediately available all in one place — as for airlines. A library has never existed that has had an utterly complete and accessible collection of everything — from notorious masterworks to obscure doggerels — in one place.[4] It's a little impossible to dehydrate all of the world's knowledge into a Library Toaster if you have to spend lifetimes rounding it all up. If anything, computers in libraries demonstrated the diversity and geographical distribution of information, through online catalogs. Online catalogs demonstrated that Library Toasters and virtual libraries were impossible fantasies, because so many other tools — beyond the appliance's only capacity to spew forth from electronic storage — were needed to net even a few kilobytes of data.

If we conceded that our Toaster couldn't deal with the magnitude of non-electronic information, we might assume that it could handle electronic data. It would be all digital, so it wouldn't represent a problem. Unfortunately, the diversity of electronic media makes this option not quite feasible. Librarians, and not library workstations, operate over the entire range, offering to their clients resources that appear on CD-ROMs, diskettes and magnetic tapes, all of varying sizes and formats in a babel of languages. If the answer can't be found on those, there's always commercial and public remote databases.[5] These technologies are difficult to synthesize except with a human interface, the librarian.

Perhaps that points to an interesting development as a consequence of the death of the library workstation. Library Toasters and their inherent virtual libraries represented a form of technologic concession of the part of one of the world's oldest professions. It meant that librarians admitted that technology alone had the ability to handle information in all of its quantity and diversity. Simply, this passive complicity meant that librarians were the "chattel of inanimate chattels."[6]

Instead, Library Toasters and their virtual libraries were flawed from the start. Imagine how you use a library. You deal with a library and its resources in stages. You walk in, acclimate yourself to surroundings psychologically and physically and then browse and hunt to your intellectual satisfaction. Virtual libraries and their operational front-ends — these Toasters — assumed that you had already gone through that preparation and were ready to be dumped into the middle of a vast and deep information reservoir.[7] Patrons turned away from Library Toasters and their lack of sympathy to this human condition of requiring a prelude. They turned to more appropriate analogs to themselves — librarians — in their searches for books, reports and videocassettes.

Rather than reduce patrons to slaves of a given computer's interpretation of information, librarians provided patrons an unprogrammable option — imagination. In our information-rich world, computers are only tools — quite handy tools in the right hands, as indicated by the tone of the essays in this volume. These instruments provide a means to escape the drudgery of manual and printed files and provide access to files which had never seen the form of paper. The value of networks was not their sum of gigabytes of stored data or their megabytic speeds. It was, as these case studies prove, the ability of librarians to use their imaginations *and* tools at hand to transform objects, to create connections, to classify resources and to find ways of taking advantage of electronic files and hardware in novel ways.[8]

The needs of our patrons are never more crucial to the survival of libraries than now. We'll find in our experiments with computers — much like many of the authors in this volume — that our patrons will surprise us with their demands and preferences. Even sophisticated clients will provide a source of wonderment. For example, a survey was recently completed of the needs of researchers in the Department of Energy. The results proved that even these computer-literate developers preferred their information in a timely fashion on paper and from local, on-site libraries or colleagues. Even with the expansion of networks, there was still a serious regard for paper as an ultimate form for data, as well as optical disks.[9]

The myth of the all-seeing, all-knowing library workstation gave us a chance to touch reality, by allowing us to confront the needs of our patrons anew in our attempts to invent virtual libraries. If library workstations earn a footnote in the history of automation of libraries, it indeed may be in their role as conceptual vehicles, allowing us to rethink, with prejudices removed, how we should make information available. As the case studies here prove, we are embarking on quite a notable adventure, where imagination triumphs, and creativity is stimulated by a remarkable combination of human intelligence wedded to mechanical fortitude.

Notes

1. Peter Davies (ed.), *The American Heritage Dictionary of the English Language*. paperback ed., 7th printing. New York: Dell, 1973, p. 726.

2. Dirk J. Stratton, "Down the paper trail," *Aldus Magazine*, v. 3, no. 2 (Jan.-Feb. 1992), p. 80.

3. Anon., "New electronic library systems represent $1-billion market potential," *Aviation Week & Space Technology*, v. 134, no. 25 (June 24, 1991), p. 77.

4. Also noted in Joseph J. Branin, "Delivering on promises: the intersection of print and electronic information systems in libraries," *Information Technology and Libraries*, v. 10, no. 4 (Dec. 1991), p. 330.

5. See summary in Mary Jo Lynch, "Access technology in academic libraries," *College & Research Libraries News*, v. 53, no. 4 (April 1992), pp. 243-244.

6. The entire quote reads "Human history is simply the history of the servitude which makes men ... the plaything of the instruments of domination they themselves have manufactured, thus reducing living humanity to being the chattel of inanimate chattels." From Simon Weil's *Oppression and Liberty*, quoted in David McLellan, *Utopian pessimist: the life and thought of Simone Weil*. New York: Poseidon Press, 1990, p. 83.

7. To quote Mark Bolas of Fake Space Labs in Menlo Park, Calif., "You want them to be able to gradually leave this world and go into the virtual reality world. It's like talking on the telephone; you don't pick it up and you're instantly talking to someone. You gradually enter into conversation and you choose how involved or uninvolved you want to be. In virtual reality, that seems to be missing." From Michael Alexander, "Virtual reality still unrealistic," *Computerworld*, v. 25, no. 25 (June 24, 1991), p. 20.

8. Daniel P. Dern, "Applying the Internet," *Byte*, vol. 17, no. 2 (Feb. 1992), 111+ and Jon Udell, "Infoglut at your fingertips," *Byte*, vol. 17, no. 3 (March 1992), p. 364.

9. Amy B. Finnerty, "DOE STI user needs study — overview of results," and "STI user needs assessment — executive summary," presented at Infotech '91 (US DOE Technical Information (TI) Meeting), 22-23 May 1991, U.S. Dept. of Energy, Office of Scientific and Technical Information, Oak Ridge, Tenn.

New Horizons in Library Training

Using *HyperCard* for Computer-Based Staff Training

Pauline S. Bayne & Joe C. Rader

The need for economically feasible, systematic training of staff in academic and research libraries spurred our original interest in investigating *HyperCard* as a tool for the development of computer-based training (CBT). Thanks to grants from the U.S. Department of Education and Apple Computer, we worked with a team of librarians to develop *HyperCard*-based instructional units that have been implemented at the University of Tennessee (UT) Libraries and distributed widely to other libraries. The program is called *New Horizons in Library Training: Computer-Based Training for Library Staff.*

PROGRAM DEVELOPMENT

We chose the topics to be developed as CBT units based on survey responses from the directors or personnel officers of the Association of Research Libraries. Extensive testing and revision of parts of the whole program occurred over the course of 15 months. The content, pacing, level of complexity, use of sound and graphics and consistency of presentation in style and format were recurring issues. Additionally, planning and programming HyperTalk scripts, with the ability to track and record trainee performance unobtrusively, required extensive effort.

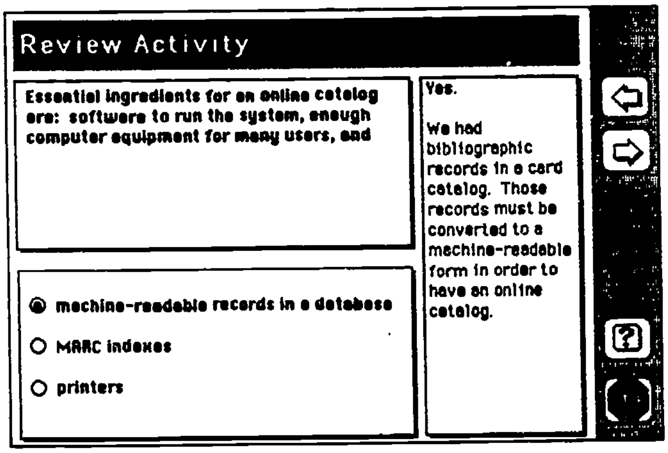


Fig. 1: In the University of Tennessee *HyperCard*-based training program for library staff, learning is reinforced by review activities throughout and by "test" questions for certain units. In this example, the right answer panel is shown as it would be after the trainee had chosen correctly.

The program was aimed at newly-hired students and full-time staff. This audience created a challenge — the program had to be simple for those who had never worked in a library but also not so elementary to bore those with library experience (Fig. 1). The goal was to convey basic information about working in libraries even though we recognized the necessity of adding other topics over time. The topics included initially were:

- orientation to libraries;
- access to periodicals (Fig. 2);
- computers in libraries;
- acquisition and processing of materials;
- reference services;
- Library of Congress classification (Fig. 3); and
- resource sharing.

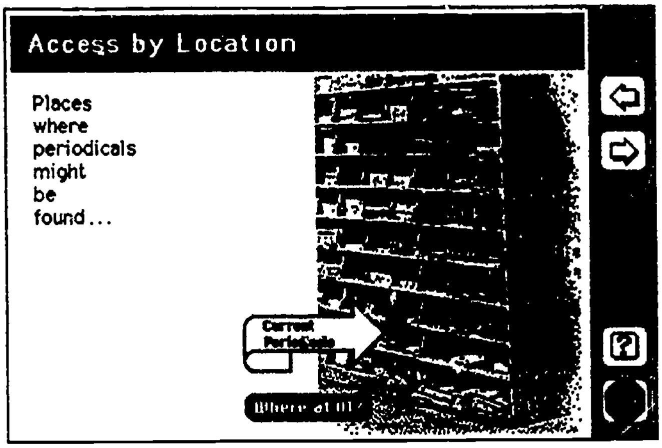
GENERIC INSTRUCTION

A central development goal was to create generic instruction, useable by other academic libraries, and perhaps public libraries, with little modification — except for the unit on orientation to the UT Libraries. Local information, such as the names and locations of library departments or processing practices, is accessed by buttons which take trainees through loops of cards or fields of information. Modifications can be made in several ways. The local buttons may simply be removed leaving the related cards in place but unaccessible to trainees. Or, local images and information may be substituted. Some knowledge of basic *HyperCard* operations is necessary, but the task is quite approachable with minimal experience. Librarians who find the training units attractive should be able to modify the small percentage of local information in much less time than it would take to develop such units.

PROJECT REPLICATION

A follow-up project was begun in June 1991 by us with Jill Keally, Personnel Librarian at UT Libraries, in cooperation

Fig. 2: The "Where at UT" button illustrates the option of allowing an institution to include local information loops while maintaining an instructional focus that is generic in its basic design.



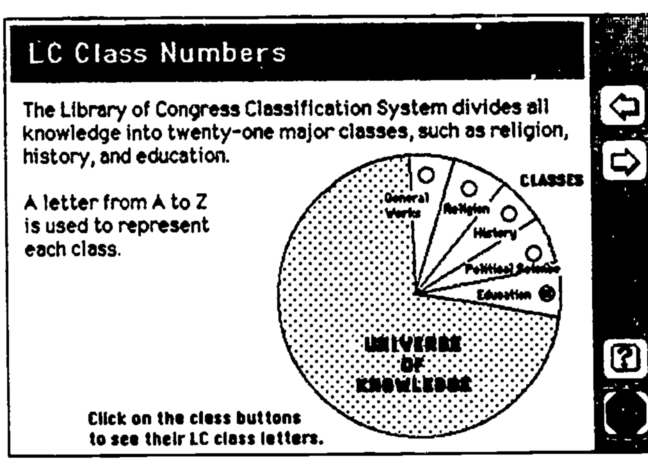
with a group of librarians at the University of Kentucky (UK), headed by Gail Kennedy. The research team decided to replace the local information in all training units, to convert the stacks from *HyperCard* 1.2 to *HyperCard* 2.0, and to administer pre- and post-tests to a group of UK Library employees who had had no prior exposure to computer-based training in libraries. UK librarians were introduced to the training units and to the implementation procedures used at UT. In July and August, local information and graphics were provided and replaced in the stacks, which were then converted to *HyperCard* 2.0, and reviewed.

Implementation of the CBT program at UK occurred between September 1991 through February 1992 in computer laboratories used both by university students and library staff. Assessment of the project will occur in the spring of 1992.

How Long Does It Take?

Modifications of local information included scanning of photographs and drawings, removal and replacement of information, design of a new menu screen, and replacement of the "Stop" button to bring each trainee back to the program menu rather than to "Shutdown." Approximately 125 screens of information in six training units were changed in 80 hours. Conversion to *HyperCard* 2.0 presented very few problems but did require painstaking review of all CBT stacks. The most common problems related to field size — either a few letters at the end of a text field were cut off or an extra line of space appeared in fields. Corrections were made

Fig. 3: Developers provided options that allow trainees to control their learning as much as possible in terms of sequence, timing, and, in some cases, amount of repetition. The goal was to make the structure unobtrusive.



by enlarging the fields slightly. *HyperCard* 2.0 conversion and checking took about 15 hours.

Program Distribution

Copies of the CBT stacks (in *HyperCard* 1.2.x) and accompanying materials are available to other libraries in two ways. The program consists of seven units on 14 diskettes and may be obtained from the Apple Library Template Exchange.[1] The *HyperCard* stacks may also be downloaded via the Internet from the University of Tennessee Library to your own computer using File Transfer Protocol (FTP).[2] The computer address is utklib.lib.utk.edu.

The program was first distributed in April 1991, and since then over 230 requests for information have been filled and more than 75 sets of diskettes have been ordered through the Template Exchange. We plan to survey those who have requested information or ordered the stacks to learn how and where these staff training materials are being used.

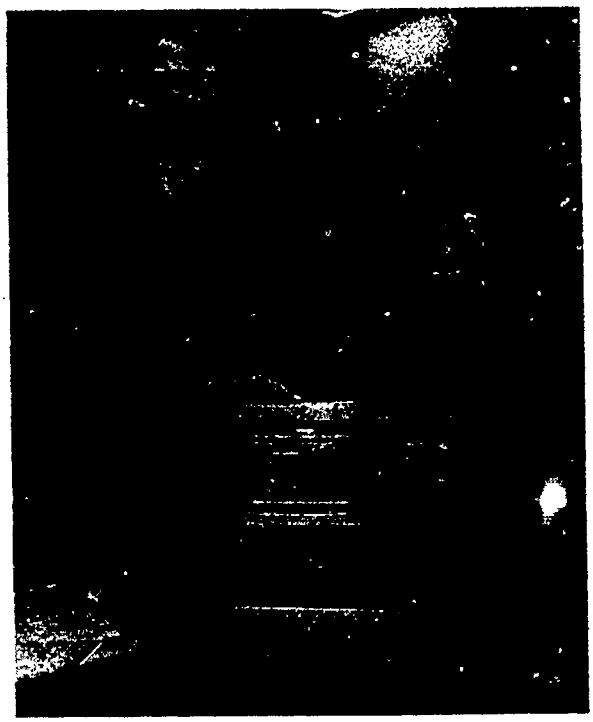
The Future

Although some aspects of the original program at UT have been completed, other CBT projects are already underway or are being planned. Representative are a one-year review of the full implementation of the CBT program at UT and conversion to *HyperCard* 2.0, adaptation of some parts of the instruction for user education, the development of additional "generic" units [e.g., on preservation of materials], and the creation of complementary staff-CBT units at the departmental level. The aptness of the title of the program is clearer now than ever —*New Horizons in Library Training* was not a conclusion but only a beginning.

Notes

1. The 14 diskettes cost $25 and are available from the Apple Library Template Exchange, Apple Library Users Group, 10381 Bandley Drive, MS. 8-C, Cupertino, CA 95014.

2. A program brochure, project report, and FTP instructions are available from us.



Joe C. Rader (left) is Associate Professor and Head of the University Archives at the University of Tennessee, Knoxville, TN 37996. Joe can be contacted at 615/974-0048 (voice), RADER@UTKVX (Bitnet), or at rader@utkvx.utk.edu (Internet).

Pauline S. Bayne (right) is Professor and Head of the Music Library at the University of Tennessee, Knoxville, TN 37996. She can be contacted at 615/974-3474 (voice), BAYNE@UTKVX (Bitnet), or at bayne@utkvx.utk.edu (Internet).

In my own way, I'm trying plan for the electronic future of the Library at Nutana Collegiate. For any other school librarian with the same aspiration, I have one practical recommendation that may not be obvious at the beginning — set aside a location that will house your file servers and centralize all your wiring. This location is commonly known as a telephone closet.

Get a Closet!

Ron Berntson

Before I start throwing out terms like RJ11, Ethernet, patch panels, and punchdown blocks, I need to proselytize. You may already be among the elect, believing that the library of the future will be heavily electronic. To be a part of that future means understanding the underlying hardware and software on which our systems are built. Ignorance means ending up with an inflexible network that doesn't meet your needs.

So, I would encourage you to master the arcanum of network hardware design. It isn't easy. First, information and expertise on network design comes from the worlds of business and higher education. Schools and libraries have different conditions — each computer may have a wide number of users and there is a high need for security (you don't want students messing with system files). As a small example, it's impractical for student workstations to have hard disks. The second difficulty you'll face is coping with the constant changes in the market place. There will always be new hardware and software that affect your decisions. Finally, information on networking is scattered; there's no convenient manual that tells you how to plan for a library or school network.

What follows is the story of Nutana Collegiate's network. In spite of the technical detail in this saga, I don't have the necessary space or time to fill you in on all you might need to know. I encourage you to read manuals, look at catalogs, talk to sales personnel and discuss networks with other more experienced librarians.

Background

As the school librarian, I'm also the manager of the school network. Right now, we have 35 Macintosh computers and four file servers to meet the needs of staff and students. Most workstations are in the computer lab, but there are also machines distributed in the library, classrooms and teacher workrooms. For a school with a population of 400 students and 17 professional staff, we are doing well.

I have a vision of the future. I want to provide easily accessible hardware and software that improves student and teacher productivity. I also want to supply a wide range of information through the network — magazine and vertical file material, collections of graphic images, encyclopædias and other computer equivalents of typical reference works. These types of materials are becoming available. There are problems with network access, cost and suitability for primary and secondary education, but many of these problems are being ironed out.

In addition to changing software and hardware, school programs change. In our small, inner-city school, enrollment patterns shift and we continually develop new programs that try to better meet the needs of our students. Even in simple and obvious ways, our school program changes — this semester we retired the typing lab, and business education is now based in the computer lab.

Flexibility

Because of these changes, a network has to be designed for flexibility. If I had to do it all over again, I would plan for better and more flexibility. It costs more money initially because you spend more on wiring; your sanity may also be questioned because it looks like you are overbuilding. However, my recommendation is to distribute your workstations and other user hardware resources wherever they are needed, but centralize network hardware and wiring in one convenient location.

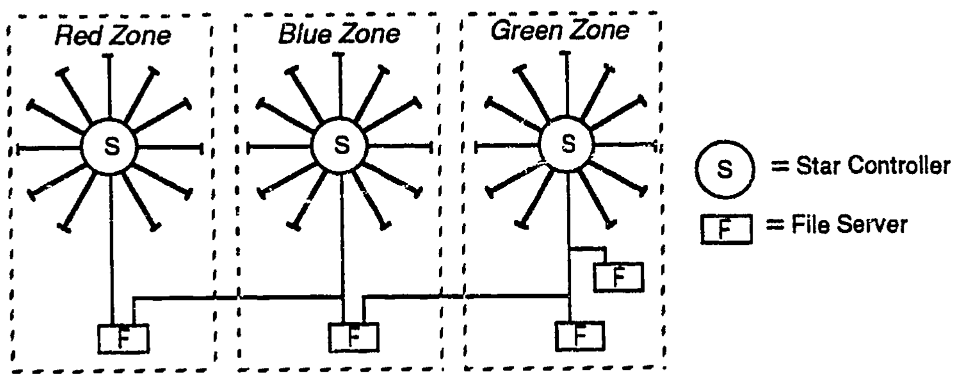
The Network

Let me walk you through our medium-sized network (Fig. 1). You have to have some physical way of connecting your computers to the file servers. There are all sorts of different wire and connectors. We've chosen, for now, to go with Farallon's PhoneNet system that uses relatively inexpensive telephone wire and RJ11 connectors (RJ11 connectors look like standard telephone jacks). We are using the built in AppleTalk network interface available in all recent Macintoshes. In the future, I predict that the faster Ethernet system will be the basis of most Macintosh networks. As evidence, Ethernet interfaces were built into the new Quadra Macintoshes released in the fall of 1991.

them. One leg of a star controller can accommodate one or two devices. It's possible to put up to four devices on a leg without network speed slowing to a crawl.

The twelfth leg of each star controller goes to a file server, running network software (*Waterloo MacJANET* in our case) and providing access to data and software. We could also attach hardware like CD-ROM players to a file server. Even using star controllers, the more devices competing on a network, the slower the traffic. It is possible to isolate different parts of your network into zones — most of the traffic occurs within a zone. This isolation is the result of using a router, either a hardware

Fig. 1: The network at Nutana Collegiate consists of 35 Macintoshes and file servers, serving a population of 400 students and 17 staff.



or software router. Again, in our case, we are using a software router (Apple's *InterNet Router*) that runs on three of the file servers. While users mostly work in one zone, they can communicate at a reduced speed with servers and other devices in other zones.

Star controllers are the most obvious feature in our network; we use the 300 model from Farallon. Star controllers are like traffic cops. Instead of many computers competing for a slice of the electronic highway, each leg of the star controller is dedicated to a few computers or network printers. While in our case the computers happen to be Macintoshes, on an AppleTalk network they could also be Apple IIes and IIGSs or MS-DOS machines with an AppleTalk card.

When a computer has to communicate with a device on another leg of the network, the star controller ensures orderly and speedy transfer of information. For each of the three star controllers on our current network, eleven of the legs have computers or printers plugged into

On the Green Zone there are two file servers on one leg of the star controller. The second server holds all of the teacher network accounts and provides some measure of security for their work.

Network Architecture

So much for the conceptual layout of our network. We lost flexibility because of the physical design. Our initial physical layout had short legs running from the computers to the star controllers and long legs going from the star controller to the room which housed the file servers. We hid two star controllers in the ceiling of the computer lab and one more in the ceiling of the library. Putting the file servers in one room has been convenient; maintenance of the network software is relatively painless.

Within a year, the flaws of this approach surfaced thanks to events over which we had little control. Rooms changed, teachers became interested in using technology in their classrooms and enrollments in classes changed. We have capacity where we don't need it and no capacity where we do need it. While we can add new wiring to service new locations, it isn't easy to shuffle all the wiring to meet the new demands. It should be a matter of unplugging unused legs and plugging in new legs. Our initial wiring made this difficult. With hindsight, the star controllers should have been located in the same room as file servers.

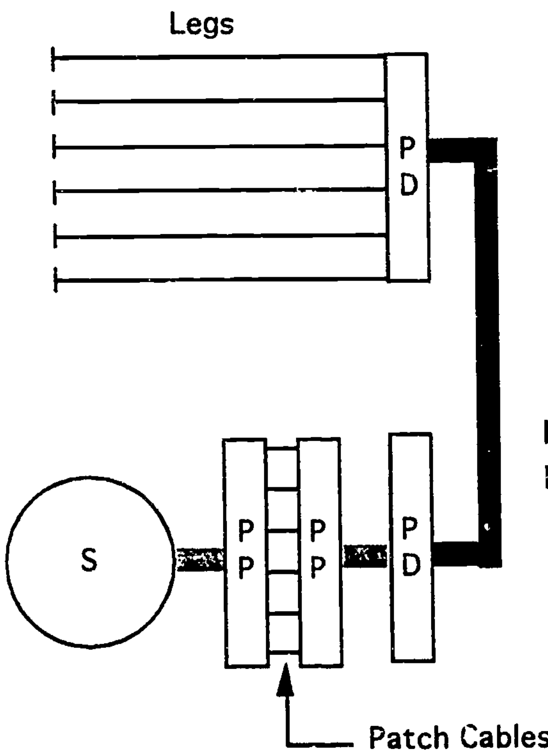


Fig. 2: A new physical layout of the network will simplify maintenance, and add greater flexibility.

Then long runs of cable should have connected the workstations to the star controllers. We will gradually switch over to this kind of setup.

Our new layout will use a number of different cabling distribution elements (Fig. 2). In any location with a large number of legs (i. e., the computer lab), each leg will be connected to a punchdown block. A punchdown block is a device for easily connecting wires. Coming out of the punchdown block will be trunk cable with the appropriate number of wires. For instance, we will be using a cable that carries 25 pairs of wire; this trunk terminates in the server room at another punchdown block. The punchdown block in the server room can be directly connected to a patch panel through a special Amphenol cable. The patch panel is simply a board with four RJ11 receptacles for every line. The star controllers also have their own patch panels. To configure the network, it's simply a matter of plugging jumpers from start controller patch panel into the cable distribution patch panel. It should be much easier. The key advantage to all this wiring is your ability to swap lines to where they are needed via the patch panels.

There are some disadvantages. First, you have to master all of the elements of the newly designed network. I've simplified it, but it's a matter of sitting down with pen, paper, and catalogs and trying out different schemes. Second, you have to be able to communicate what you want and why you want to do it to the technician doing the wiring as well as to the principal who's paying the bills. Third, this "luxury" wiring scheme adds to the total cost of your network. A roll of 25 pair wire cost us over $US 1,000. The punchdown blocks and patch panels are all additional expenses. However, you can develop your system in stages. Put the trunk cable and punchdown blocks in first and temporarily wire the star controllers. The patch panels can come later. A final advantage to this kind of scheme increases the chances of a "break" in the cabling. Installation has to be carefully done and tested.

Last But Not Least

Two final considerations might go into your network wiring — Ethernet and Wide Area Networks. First, try to build in extra capacity. In addition to adding more PhoneNet legs, unused wires in the trunk cable may come in handy when it comes time to use Ethernet. One version of Ethernet — 10Base-T -- uses four telephone wires instead of PhoneNet's two. If you add Ethernet capacity, it should simply be a matter of rewiring punchdown blocks, adding new patch panels and not having to restring cable.

Our school system has been developing an inter-school network based on Digital Equipment hardware. Other schools and libraries in our jurisdiction also have AppleTalk or MS-DOS based networks. Beyond our immediate area, there are a number of opportunities for connecting electronically. Just as businesses are connecting locations through wide area networks, I envision a day when schools and small libraries will be tightly connected through electronics. How this will be done, I don't know for now, but I'm keeping my eyes open. This is just one more stage in planning our future electronic library.

Ron Berntson is the Librarian and Network Manager at Nutana Collegiate in Saskatoon, Saskatchewan. When not battling cabling and star controllers, he can be reached at his school at 411 Eleventh Street East, Saskatoon, Saskatchewan S7K 5H8 Canada.
Phone: 306/653-1677.

As a serials librarian and supervisor, I find my few voluntary hours each week in Reference Services a truly humbling experience.[1] My command of serials lingo and skills as a supervisor matter little to patrons needing a quick answer to yesterday's assignment. My expertise does little to help a student with only ten minutes to spare, preparing a speech in Communications 145. Questions such as "Which journals have articles about drugs? — I don't need to see them, just list them," or "I have to look at three music journals — where are they?" hurriedly bring to my mind images of OPACs, COM

Current Periodicals:

Subject Access the Mac Way

Constance L. Foster

catalogs, CD-ROMs and directories for answers. Almost instantaneously, however, I reach calmly for the *WKU Libraries Subject Guide to Current Periodicals*, a modest 27-page document in a plastic report cover. I turn to the subject in question and find a list of periodicals. This printed guide is a result not only of my hours at the reference desk and in the serials unit but also the product of a Macintosh computer and several software programs. This guide lists all of our library's current, uncataloged periodicals and newspapers. It serves as an additional access point for information in our medium-sized library.

To assimilate 2,550 titles into 70 distinct subjects was possible thanks to our online serials check-in and information management system at the Libraries of Western Kentucky University and the ease and fun of using a Macintosh. Through the Faxon Company's LINX system, we communicate with a mainframe computer thousands of miles away. With Faxon's serials check-in component called SC-10, we immediately update our serials records and receive quick turnaround time for management reports, based on several fields such as fund, routing, call number, Library of Congress (LC) subject classification code. When we first input all of our check-in information eight years ago, we also made the decision to utilize as many fields as possible for complete serials information online and to select the appropriate LC code for the "sisl" (subject information service line) field. For uncataloged periodicals, we assigned a two-letter LC code in the absence of a standard code.

To compile a guide based on subject headings, we first requested a printout by "sisl" of our complete check-in records from Faxon. This computer printout served as our working copy. Next we eliminated extraneous titles, cataloged serials or membership records that were not true current library periodicals. We included all titles that are shelved in the main library, Kentucky Library, Educational Resources Center, and Science Library.

We then scrutinized the assigned LC headings in relation to our university's current catalog of department names (Accounting, Home Economics, Physics and Astronomy, etc.) and course offerings in the semester registration bulletin to coordinate terminology and refine headings for local use. This process took approximately 40 hours of staff time (for one person) with consultations and revisions by me.

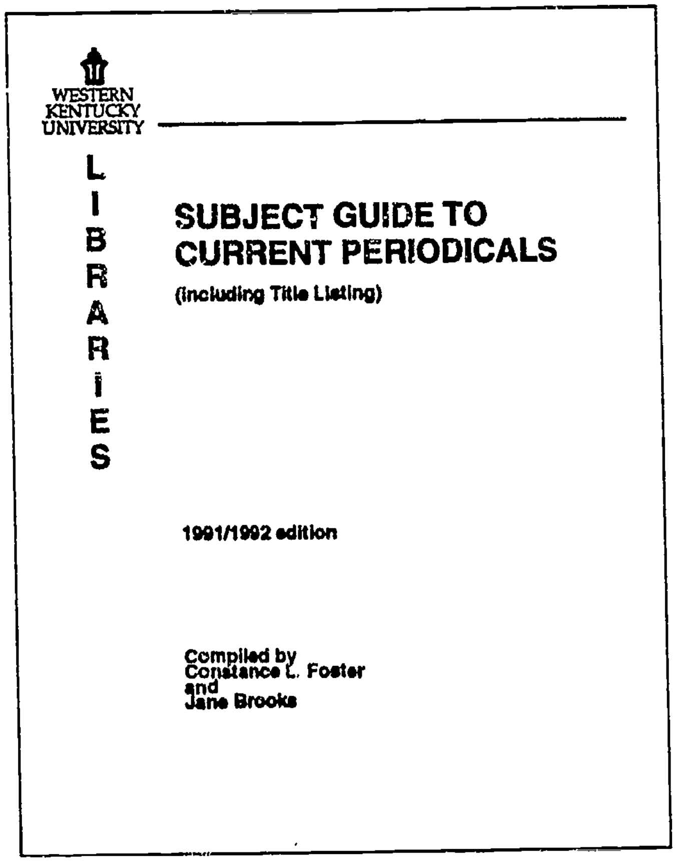
With a list of 79 subject headings originally for 2,550 titles, we used a Macintosh Plus at the Faculty Media Center and a very early version of Microsoft *Works* to alphabetize the titles within each subject.[2] We treated each subject heading with its periodicals as an individual export file. Piece-by-piece, the whole document was transported into a layout and design program (*Ready,Set,Go!*, version 4.0 at that time) for final presentation in a two-column format. The pages were linked together so that the entire document adjusted automatically for each addition or deletion. If we started from scratch now, we would certainly simplify our methods and take advantage of more powerful applications.

Data entry involved two people (a staff member and me) for about 37 hours, or a three-week period, and an additional three hours to move all the export files into *Ready,Set,Go!* The database was easily the most time-consuming part of the entire assignment. To keep track of new titles, deletions, and other changes that affect the file, I keep a "working" copy of the guide at arm's length to record updates immediately. This process ensures the reliability of the guide and the database (in part, thanks to my home-bound Macintosh SE/30).

The final version of the *Subject Guide* is issued by the University's print shop or copy center. We follow a format consistent with other University Libraries publications (Fig. 1). The Dean of Libraries distributes the guide to department liaisons, department heads, deans, and directors each fall during his meetings with the various colleges. Each library faculty member receives a copy; the reference and periodicals librarians keep own way of housing the guide. Originally, we published the guide twice a year; now we only print it in autumn. Printing costs for 1991 remained fairly stable. By switching to the University's copy center from the print shop, we actually reduced costs to $55.00 for 125 copies, without sacrificing quality.

In addition to its use as a reference tool, many library faculty compile statistics

Fig. 1: The title page of the *Subject Guide* follows the University format for all publications. It is updated on an annual basis, with an additional file of periodicals listed alphabetically by title.


WESTERN KENTUCKY UNIVERSITY

L I B R A R I E S

SUBJECT GUIDE TO CURRENT PERIODICALS

(including Title Listing)

1991/1992 edition

Compiled by
Constance L. Foster
and
Jane Brooks

copies at their information desks for quick access. We also send a copy to the public library and upon request to the general public.

For 1988, printing cost $74.00 for 120 copies with an additional $14.00 for report covers. We discontinued furnishing report covers and now distribute the guide with stapled pages and a note to discard earlier editions. We assume our patrons reuse the original binder or devise their from the guide for reports requiring number of titles held in a specific area like "Reading," "Education," or "Nursing." It is particularly useful for accreditation reviews and for new faculty to assess the collection in terms of individual expertise (Fig. 2). The collection development coordinator and librarians with departmental liaison responsibilities use it to check for titles noted in core lists, for support of new programs, or for bibliographies, just to name a few uses.

Fig. 2: A sample page from the *Subject Guide* lists titles in architecture, art, astronomy, and banking, revealing the diverse nature of the Library's holdings and the range of disciplines within the University.

ARCHITECTURE

American Planning Association
Architectural Design
Architectural Digest
Architectural Record
Architecture
Contract Design
Planning
Professional Builder & Remodeler
Progressive Architecture
Society of Architectural Historians. Journal

ART

American Art Journal
American Artist
American Craft
Antiques & Collecting Hobbies
Apollo
Archives of American Art. Journal
Art & Academe
Art & Antiques
Art & Design
Art Bulletin
Art Direction
Art Education
Art History
Art in America
Art International
Art Journal
Artforum
Artnews
Arts Magazine
Asian Art
Burlington Magazine
Canadian Art
Communication Arts
Fiberarts
Glassworld
Gazette des Beaux Arts
Graphis Magazine: International Journal for Graphic Art
Journal of Aesthetic Education
Journal of Early Southern Decorative Art
Louisville Review
Magazine Antiques
Master Drawings
Metropolitan Museum of Art. Bulletin
NAEA Advisory (National Art Education Assn)
NAEA News
New Criterion
School Arts
Sculpture Review
Smithsonian Studies in American Art
Southern Accents
Studies in Art Education
Studio International
Tamarind Papers
Wind
Winterthur Portfolio
Zeitschrift fuer Kunstgeschichte

ASTRONOMY

American Astronomical Society. Bulletin
Archaeoastronomy
Astronomical Almanac
Astronomical Journal
Astronomy
Astrophysical Journal
Astrophysical Letters and Communications
Astrophysics and Space Science
British Astronomical Association. Journal
Experimental Astronomy
Griffith Observer
Icarus: International Journal of Solar System Studies
Journal for the History of Astronomy
Planetarian
Royal Astronomical Society. Monthly Notices
Sky and Telescope
Soviet Astronomy
U.S. Nautical Almanac Office. Almanac for Computers
Vistas in Astronomy

BANKING

ABA Banking Journal
Bank Management
Bankers Magazine
Federal Reserve Bank of Atlanta. Economic Review
Federal Reserve Bank of Chicago. Economic Perspectives
Federal Reserve Bank of Cleveland. Economic Review
Federal Reserve Bank of Dallas. Economic Review
Federal Reserve Bank of Kansas City. Economic Review
Federal Reserve Bank of Minneapolis. Quarterly Review
Federal Reserve Bank of New York. Quarterly Review
Federal Reserve Bank of Philadelphia. Business Review
Federal Reserve Bank of Richmond. Economic Review
Federal Reserve Bank of San Francisco. Economic Review
Federal Reserve Bank of St. Louis. Review
Financial Analysts Journal
Financial Executive: FE
Financial Management
Financial Planning
Financial Review
Financial World: FW
Forbes (+micro)
Fortune (+micro)
Independent Banker
Institutional Investor
International Monetary Fund. Balance of Payments Statistics
International Monetary Fund. Direction of Trade

3

When academic departments like Management and Marketing split, we accommodate that change by dividing the journals into two separate subject areas. Since our government faculty teach political science and prefer all titles under government, we make a cross-reference, "Political Science see Government." We try to stress in a low-profile manner that the guide is not an accurate representation of departmental fund allocations and that it does not represent a mechanism for budgetary decisions. We have more sophisticated reports from Faxon for that purpose.

The guide has also aided in the battle against rising serials costs. I used it to create a document entitled "Serials Costing $200 or More." It is arranged by college and by fund code using the Macintosh and a word processor. This list is extremely useful in highlighting the escalating prices of journals, especially scientific, medical, and technical titles.

Once the *Subject Guide* appeared, suggestions for enhancements surfaced through memos, conversations, and self-imposed ideas. A recent improvement is an alphabetical title list of current periodicals, appended to the guide. Although this listing adds 14 double-sided pages to the guide, the arrangement is useful for those confused over potential subject headings for a specific title. This particular process took four and a half hours to transfer the initial export files into a word processor for alphabetical sorting and editing. Another four hours was used to match the list against the most recent guide, noting all the changes since the 1988 edition. Title access offers a quick check to the serials holdings of the University.

In some ways we may have created a monster, requiring constant feeding and care. The initial concept of subject access to periodicals has turned out to be quite popular. With the serials database in electronic form, we manipulate the information more easily, as in the case of creating a title list. Even with more complete bibliographic access to periodicals in the near future via an integrated library system, the need for almost instant reference via a paper guide will not disappear for a while.

In our high-tech library world — surrounded by coaxial cables, fiber optics and the bleeps of PCs and CD-ROM workstations — the guide is a resource filtering the overload of information by offering basic facts on current periodicals. By its very nature, it guarantees absolutely no down time. It offers to our clientele a computer product without the interface, in a most familiar medium.

Notes

1. This article is a revision of "Subject Access to Periodicals: A Main-Mac Combo" which first appeared in *College & Research Libraries News* in February 1990 (v.52, no.2). Permission to reuse portions of the text has been kindly granted by the American Library Association.

2. Our Library and campus are not very Macintosh-oriented, so the Faculty Media Center and the new grant-funded Center for Teaching and Learning represent havens for Mac users.

Constance L. Foster is Associate Professor and Serials Supervisor at the Helm-Cravens Library, Western Kentucky University in Bowling Green, Kentucky 42101. She can be reached by phone at 502/745-6160, or electronically on Bitnet at NFOSTERC.WKYUVM.

A team of librarians have been at work in the Wilson Library at the University of Minnesota for over a year now, to complete the first phase of a computer-assisted instructional (CAI) project dubbed "ilLUMINAte." Named after the University Libraries' successful online public catalog, LUMINA, the ilLUMINAte modules include the following:

Project ilLUMINAte

at the University of Minnesota Libraries

Celia Hales-Mabry

- tools to search LUMINA via author, title, subject, and keyword;
- a means to identify and locate periodical articles; and
- navigational guides to the Library.

A successful pilot was carried out in the autumn of 1991 in the University of Minnesota's College of Liberal Arts (CLA) in the Composition Program. Revision of the modules is underway, based on the feedback gleaned from this experiment. Full implementation in classes is anticipated for fall 1992.

What Else Does It Entail?

This CAI project is not *just* computer-based. Teaching assistants in CLA's Composition Program can give their students a broader understanding of the utility of the Library using several tools including ilLUMINAte, and transparencies prepared by the Library staff. These enhancements are completely voluntary and depend upon the interests of the teaching assistants.

How Will It Be Implemented?

Teaching assistants sign up their classes for a laboratory session or sessions during class time. Surprisingly, this scheduling was preferred by teaching assistants in the pilot, in spite of free access to the lab during other hours. Several programs will eventually be involved, including the University's writing program in the General College. There may be some 10,000 students in any given academic year that will potentially benefit from this program, making it one of the largest of its kind. These statistics reveal the importance of this project; the library staff cannot handle such numbers of students in any other way. ilLUMINAte offers an option to provide an interactive learning experience that potentially is even *more* effective than classroom instruction.

Why Do We Need This Program?

Undergraduates using the University of Minnesota Libraries confront a formidable array of obstacles. The vast majority of students arrive at the University without experience in using a research library, and with no uniform set of basic skills for library use. They are not currently required to take any instruction introducing them to library resources, or to the broader issues of information proliferation and evaluation. New computer technologies will make the Libraries even more difficult to comprehend, as these systems change over time while students attempt to make sense of them. The sheer number of students at the University of Minnesota needing orientation and instruction far outpaces the number of librarians providing orientation and instruction through conventional means.

Who Are The Faces in The Project?

The computer-assisted instruction project involved a team including Celia Hales-Mabry (Project Leader), Kay Kane, Barbara Kautz, Loralee Kerr, Mary Koenig, Julia Schult, and Shirley Stanley. Julia Schult provided much of the script writing and computer "whiz" work, as the only member of the team with previous experience in computer programming. In our own debates on our dependency on Julia's skills, we realized that it would definitely have been necessary to consult with an accomplished programmer to formulate the relatively complex scripts that are a part of the project. *HyperCard* can be learned, however, and that fact stimulated us to investigate the potential of the Macintosh for this effort.

Additionally, Susan Hoffman handled the pilot implementation and evaluation for the College of Liberal Arts. Karen Beavers prepared the transparencies. And Susan Gangl will handle an upcoming pilot in the General College.

A twist to the usual application of the Macintosh is that one of the modules (the keyword module, authored by Shirley Stanley and Mary Koenig) is written in IBM's *ToolBook* application. Students in the lab resisted very little in switching from one computer to another. In the future, all modules will be available on both Macintosh and IBM platforms.

Another team of librarians at the University of Minnesota, based at the St. Paul Campus Libraries, are also writing computer-assisted instruction with *HyperCard*. Their project is for a stand-alone course in the Department of Rhetoric. In total, we are experimenting in a variety of ways with providing library instruction via CAI at the University of Minnesota.

What Might We Recommend to Others?

Our feedback was far more positive than otherwise, but one fact has emerged so far: Be interactive! Allow the Macintosh user to input data directly on the keyboard, and to have an opportunity to provide immediate feedback. Try to maintain a certain tempo to the instruction, and don't insult your audience by going too slowly, or at too elementary a level. Students like to have some choice in the course of inputting. They enjoy immediate feedback to test the accuracy of their work.

Frequent tests were welcomed by the students. In our project, we are not setting up the computer to grade tests. Students do not feel threatened when they know that only *they* know the results, and that they are learning.

Would We Do Anything Differently?

There are some operational changes in the course of our work that would have resulted in some improvements. There is a decided advantage to having reference librarians learn the computer program. If funding is later cut, the program may be slowed down, but will not be jeopardized. Most of us wrote directly on the Mac, others used word processors, transferring information eventually to *HyperCard*. Either input technique seems to work equally well; it is a matter of personal preference.

One must be tolerant of delays and setbacks. In our own project, we have not been able to expand to further modules in the current year, as planned, because of staff cutbacks. Unfortunately, we lost our most experienced scriptwriter; we are quite fortunate to have learned *HyperCard* in the course of the project. There is a steep learning curve to *HyperCard*. Once the initial fear over programming has subsided — and you are really "into" the program — the work progresses smoothly. Certainly allowances have to be made for floundering; you need to be tolerant of yourself and your group during this necessary hurdle. Snags in the program are to be expected and should not be treated as major roadblocks. Just work your way through them with patience.

Summary

This program was not developed overnight. With a beginning, a group of eight librarians are carrying the project forward. Given the constraints of staff size, budget, and rising student population, there is a need for a new approach to the very real problem of meeting student needs in using the Library. A course-integrated CAI program of library instruction is an idea whose time has come, and the University of Minnesota Libraries is poised to offer just such an option to many of its students.

Celia Hales-Mabry, Ph.D, (center) is Reference/Instruction Librarian at the Wilson Library of the University of Minnesota. She originated the concept of iILUMINAte and heads up the project. Her background in bibliographic instruction includes leadership, since 1980, in various programs at East Carolina University, the University of North Carolina at Charlotte, and the University of Minnesota. She can be reached at the Humanities/Social Sciences Libraries, University of Minnesota, 180 Wilson Library, 309 19th Avenue South, Minneapolis, MN 55455. Phone: 612/624-5578.

The Project iILUMINAte team. L to R: Loralee Kerr, head of the Entomology, Fisheries and Wildlife Library; Kay Kane, reference/instruction librarian; Celia Hales-Mabry; Barbara Kautz, reference/instruction librarian; and Julia E. Schult, reference librarian for MINITEX, Minnesota's statewide library network. Not shown are Mary Koenig-Loring, coordinator of the University of Minnesota Libraries' activities for the Title VI International Studies grant, and Shirley Stanley, bibliographer for sociology and social work at the University of Minnesota Libraries.

Pat:
Got the Apple
Grant!

Help!!!!

Henry

Thinking back, I was excited to see that note. I knew that Henry Bates, our intrepid director, was applying for a grant from Apple Computer under the Apple Library of Tomorrow (ALOT) program. What I didn't know was that it would consume my life for a year and a half.

Pat Hunt

The grant proposal summarized the project as such:

"Using scanning and voice recorder technologies with CD-ROM capabilities, the California Indian Library Collection Project and Mendocino County Library will work in collaboration to develop a multimedia database that will electronically disseminate information to various organizations and individuals interested in Native California, and build a model for developing and distributing tribal archives."

Yeah, sure.

Jane Heiser at the California State Library, which gave us additional support, told us "to go ahead and make mistakes, fail if necessary," but find out how to use technology in libraries.

I am the bookmobile driver for Mendocino County Library. It happens often these days that the computer hobbyist, who may be the janitor, is suddenly promoted into another realm because of a sudden onset of technology. I have a strong interest in computers and had been very busy in volunteering to set up the computers at our library and encouraging everyone to use them. So when Henry looked around for someone to help with the Apple/ State Library grant I was the guy. The bookmobile is a part time job so it left me time to work twenty or more hours a week on the grant.

Most articles in *Macintoshed Libraries* are about putting Macintosh computers into libraries. We tried to put a library into a Macintosh computer. As most librarians know, demographics do not project a rosy future for libraries. The population groups that are growing at the fastest rate are those that do not use libraries. We hope that by working with material from an oral culture, and delivering them with high technology, we can explore a way to reach those future populations.

I had no idea what we might do to make good use of the grants. Even so, I wasn't worried, because we had a meeting in Sacramento with the staff of the California State Library and a consultant recommended by Apple: the high powered Abbe Don, as well as the formidable Professor Lee Davis from the Lowie Museum of Anthropology at Cal Berkeley. I just knew they would tell me what to do. When we all sat down at the meeting table everyone looked at me, and Jane Heiser asked "Well, what are you going to do?"

It is not difficult to digitize books. A CD-ROM can hold a shelf of them and they can be easily searched for keywords. This is a proven technology. We didn't do that. Instead, we scanned hundreds of photographs and digitized an hour and a half of audio recordings, trying to present them with an interface calculated to de-emphasize the written word.

Fortunately when we knew we had the grant I had called around to discover the Macintosh people in our area (I wasn't one of them). Mendocino is a rural county and each person I contacted knew of someone else. The success of the project was going to depend on getting the community to participate. All of those original contacts are still active in helping this project.

We had no particular accountability except to make a presentation to Apple. We had meetings that allowed our imaginations to run wild. We were building the "global brain." One night we were vacillating about whether to narrow our focus on baskets and get a simple product out. One of the group said maybe if we kept looking for a vision it would be more important than getting a product. That gave us strength and the vision we came up with was to *Let The Material Speak*. There have been enough historians and anthropologists interpreting the past. We have the tools here to present the original materials and let people draw their own conclusions. We had a license to be radical.

I was very excited when the equipment began arriving. When I saw the box with the "fx" written on the side I knew that prayers are answered. We had a bit of a buying panic because the money had to be spent by the end of September '90. I did a crash course in Macintosh hardware and software.[1] *We got much good advice; some of it at the last possible minute.*

Many people volunteered to work on the project. The scanning and photo processing went on and on. Some came to play with the fancy toys; some came for humanitarian reasons; some liked the futurist information society aspect. For whatever reason they came and they did good work. Over all, like a guiding light, was the hero volunteer: White Wolf, our cultural adviser, whose inspiration never failed.

We were inventive in designing our interface and avoiding text but it has a limited life; we have a lot to learn about interfaces. They will evolve rapidly. The photos and audio files, on the other hand, are forever. We tried to keep photo and audio files separate from the interface. With improved and faster search engines, the CD could still be used for its content.

I would come in from the bookmobile run and there would be a volunteer, say, Andrea, with a stack of photos, painstakingly scanning them in and processing them. When I started this deal, I had a picture of myself in an ivory tower learning new software and being creative. It turned out that I was a coordinator, a writer of memos, a phone answering machine, a scheduler of meetings, in short, yuck, an executive. Nevertheless, it was a chance to perform, an opportunity to do something well, and it motivated me to the max.

We made some of those mistakes for which Jane Heiser had given permission. We produced a newsletter to describe the project but the photos we could afford to reproduce didn't do justice to the excellent quality on the monitor. We had to suppress the newsletter because it would give the wrong impression and no amount of verbal explanation would wipe it out. A second mistake was trying to go too far. We developed an algorithm in *HyperCard* that allowed the user to click anywhere on the photo and magnify that part. This was a powerful feature since you can't predict what someone might want to zoom in on — a tool or a face, etc. — but it took too long, even on the Macintosh IIfx. The large file size for the high resolution scans took up too much space and would have cut into the space for sound files. So we aborted that process archiving all the scans in a high-res format so, when the hardware catches up, we can use them.

I am most proud of the fact that we got these materials into a form that makes them readily accessible. The photos are from several sources and some are uncataloged. As we looked for material we found that there were thousands of photos of our county's natives. Many are in boxes in the back rooms of libraries and museums. It is difficult and expensive work to catalog photographs. And just how do you index a tape recording of a person's history? And how do you circulate it? The computer knows.

We have a free text search that can quickly search every word of the documentation for keywords and make a list of photos and audio files that match the criteria. The oral history sound files were also transcribed to a searchable text form. This allows the user to type in a word and immediately access all the audio files that contain a keyword.

As I worked with the material, the profundity of the Native American's history began to permeate me. Slowly the disturbing truth dawned on me. This rich and successful culture, one that lived in balance with the ecology of these hills for ten thousand years, was intentionally wiped out by bureaucratic *policy and greed. None of this is explicit in the database. We do not take a historical perspective nor try to interpret the original source material. Still, parts of the oral histories make you think. Then, seeing all their tools and toys and art made from natural materials, it starts to creep up on you what happened here. This too was motivating because it touched my heart.*

We staged a number of encouraging demonstrations while the project was still in an early stage. A number of Native Americans, librarians, museum staff, and educators, among others, gave us the impression that we were making a valuable contribution. We were bringing a wonderful resource to the surface of the infosphere and especially to Native Americans.

When it came time to do the demo for Apple, I was absolutely terrified. The other ALOT projects from Yale, University of Alaska, OCLC — all these heavyweights — had already presented. And here's me, the bookmobile driver. The conference was great. It was fascinating to see what kinds of things people were doing. You know, all librarians have a humanitarian mission, so they really warmed to our project and gave us a lot of strokes. I went from being petrified to feeling like a hero during a twenty minute demo.

The database has been pressed as a CD-ROM for distribution to other county libraries who may want to use it as a model.[2] We hope it does encourage others as one of the messages we got is that these cultures are fading fast. If we don't capture it now it will be lost.

As we were running over the time allotted to finish the project, I sat down with Henry with a list of features we would have to jettison if we were to put the CD to bed. Henry said 'throw them out; we're done.' The next day I went ahead and wrote the code for most of them anyway. There are still some gaps in the product. I would have liked to include a more complete interface for the audio files. Also I wanted to include an editor that would allow printed output but, oh well, it was a prototype. Oh yeah, and the very night I sent the data to the CD factory I was talking to a real HyperCard *programmer at a party and he told me a way to triple the speed of the search algorithm. We will try to get funded to continue.*

Notes

1. A list of software and hardware includes:

Hardware:	Software:	
Mac IIfx 8MB RAM 170 MB HD	Image	DiskTop 4.0
Color monitor and card	HyperCard	QuicKeys
Extended Keyboard	Adobe Photoshop	Boomerang
LaserWriter II NT	TypeStyler	On Location
CD-ROM player	MediaTracks	Director
Modem	FileMaker Pro	SAM
CPU stand and cable kit	Lightspeed Pascal	Retrospect
La Cie color Scanner	Microsoft Office CD	HyperSpell
Hard drive (600 MB)	QuarkXPress	Adobe Illustrator
Cartridge drive	Correct Grammar	FileGuard
Cartridges(25)	SUM II	Virtual
DAT backup drive	OmniPage	MacDraw
Floppies (100)	OmniDraft	DiskExpress II
Tilt swivel monitor stand	Super LaserSpool	Calendar Maker 3.0
Diskette holders (8)	DiskDoubler	CanOpener
AudioMedia	Suitcase II	MacWrite
Power strip - surge protector		
Daisy Chain cables		

2. Here's a brief description of the product —

Product name: *Singing Light*
Language: English (Native songs in original languages)
Version (!!): 1.0
Grade Range: 5th grade through adult
Subject area(s): Indians of North America - California - Mendocino County
Key words: American Indian: art, crafts, portraits, history, audio recordings, etc.
Product Description: Produced with the assistance of grants from Apple Computer (ALOT) and the California State Library, this product is an interactive multimedia demonstration of Native American life, culture, and history, portrayed with the latest sound and image technology. There are more than 300 photographs (mostly grayscale) plus an hour and a half of audio files including songs and local oral histories. The text of the oral histories is visible on screen as well as audible.
Includes: CD-ROM (manual on disc)
System requirements: RECOMMENDATIONS: Fast Mac II, 4 MB RAM (bare minimum), System 6.05 or later. 256 shades of gray (8 bit) display, compatible CD-ROM player with audio out (speakers or headphones).
Price : $99
Publisher name: Mendocino County Library
Street address: 105 North Main St.
City/State/Zip: Ukiah, CA 95482
Phone: 707/463-4492
Fax: 707/463-5472
AppleLink: ALOT18

Pat Hunt is the bookmobile driver for Mendocino County Library, as well as a member of the team creating Singing Light, a description of Native American life in Mendocino County, California. Pat pretends to be interested in stunt kites, video, and music to keep people from thinking he is a complete nerd. He can reached at the Mendocino County Library, 105 North Main St., Ukiah, CA 95482. Phone: 707/463-4492. Fax: 707/463-5472. AppleLink: ALOT18.

Keeping up with the Macintoshed Joneses is a tricky feat for our New Prague (Minn.) Middle School Media Center. When you're n[illegible] sufficiently Macintoshed, it's hard to puff out your chest too far. With just 10 Macintosh computers in a building of 600 students and 50 teachers, it's tough to swagger around at technology conferences like you're one of them. It's even more difficult when you're assumed to be part of the club, and the language shifts from English to computerese. A conversation including INITs, CDEVs, DIS, DOS and DAT leaves you breathlessly replying "ya sure, ya betcha." Cutting edge of technology? More like the bleeding edge. We're a long way from Cupertino in more ways than one.

A Teacher's Dream... A Student's Nightmare:

The Minnesota State Test Item Bank on CD-ROM

Keith Johnson

In spite of our cultural and technological distances, we are using a tool that might generate the curiosity of other schools. It's called the MIDEBANK (pronounced "mighty-bank") and it exists as a CD-ROM for both Macintoshes and IBMs. MIDEBANK is an acronym that translates to the Minnesota State Test Item Bank (don't ask how they got MIDEBANK out of that). This educational tool is available to Minnesota teachers to make their jobs easier, and students' lives, well, uneasier. It's a teacher's dream and a student's nightmare.

THE HORROR...THE HORROR

Imagine you're a student (remember?), and your social studies teacher has access to a Macintosh computer, with a CD-ROM drive. On the CD-ROM are over 45,000 social studies test questions . . . 45,000 test questions! The nightmarish implications are easy to imagine . . . "read Chapter 10 for Monday, and be prepared for a 1,000 point quiz." In the past, no teacher could humanly (or humanely) come up with such a test. Thanks to the MIDEBANK on CD-ROM, Minnesota teachers can conceivably unleash the Ultimate Test on their unsuspecting students. What a future. Shades of the Jetsons. Poor Elroy.

Of course, we all know that no teacher would ever exercise such a cruel option (well, okay, maybe we can think of one or two that might), but the power is there. Students are now left to ponder the Tough Question: will their teachers push the "button" that will effortlessly unleash kazillion-point tests?

WHO, WHAT, WHEN, WHERE, WHY, HOW MUCH?

On the Macintosh, MIDEBANK contains 120,000 test questions in ten subject areas: agriculture/agribusiness, art, home economics, health, language arts, media and technology, math, music, science, and social studies. Most of the test questions are multiple-choice, but 3,400 of the questions are open-ended and require the student to answer in essay form. The sheer quantity of options available to a teacher will grow as more and more test questions are added annually.

All MIDEBANK test items are aimed at the Model Essential Learner Outcomes listed by the Minnesota Department of Education. Also, questions can be selected with an eye on Bloom's Taxonomy of Educational Objectives (remember those? — knowledge, comprehension, application, analysis, synthesis, evaluation). Test questions can be edited, new questions can be added, and tests can be saved and revised from year to year.

This product exists in CD-ROM in both MS-DOS (IBM) and Macintosh versions. The DOS version is an 'older' edition, while the Macintosh version just emerged out of the beta stage at the beginning of the 1991-92 school year. Both versions boast different advantages. The DOS version searches for test questions quicker and prints tests faster. The Macintosh version is more flexible, allowing teachers to add their own test items and edit existing test items. The Macintosh MIDEBANK is in a pseudo-*HyperCard* format (while the DOS version is not). The product also takes advantage of the Mac's ability to manipulate sound, with two additional CDs containing musical excerpts. These sound bites vary in length from 10 to 60 seconds, and include samples from Bach's *Cantatas*, Copland's *Appalachian Spring*, Mozart's *Symphony No. 41*, Tchaikovsky's *Nutcracker Suite*, Stravinsky's *Petrushka* and *Rite of Spring*, Duke Ellington's *Black, Brown and Beige Suite*, Leonard Bernstein's *West Side Story*, plus other selections. In all, there are 170 different musical excerpts. Graphics are part of both the DOS and Mac MIDEBANKs to accompany test questions.

A Kazillion? Really?

Here's a listing of the number of questions for each subject area:

Subject	Closed	Open	Total
Agriculture	4,203	544	4,747
Art	1,111	58	1,169
Home Ec	1,437	749	2,186
Health	2,607	611	3,218
Language Arts	19,468	717	20,185
Media & Tech	815	3	818
Math	23,733	79	23,812
Music	1,010	465	1,475
Science	17,531	5	17,536
Social Studies	45,357	150	45,525

The sheer numbers look impressive (even outlandish), but as you narrow the focus of your selections from general to very specific, the quantity becomes less daunting. For example, looking for math test items, you progress from subject (math), to course (elementary math), to outcome (adding whole numbers), to cluster (addition problems), to subcluster (adding 2-digit numbers). There's much to be added and refined to MIDEBANK yet, but it's at a stage now that shows plenty of possibilities for improving teaching and assessment. And fear not, there is a limit of 120 questions per test.

At the New Prague Middle School we have MIDEBANK CDs and CD-ROM drives for both Macintosh and IBM computers in the Media Center. Because of the relative novelty of these electronic test banks, we're still in the early stages of coaxing and convincing teachers of the value to use these products.

The compact discs are updated with new questions and new subject areas each year. Test questions and indexes are created by Minnesota teachers and other educators, and as curricula evolve, questions and indexes are revised to reflect those changes. The most recent push has been toward Outcome Based Education (OBE) and the test item bank contains OBE performance questions. Cost of the MIDEBANK CDs? They're free to Minnesota school districts.

Enough of MIDEBANK...What Else Do You Have?

Since teachers have the advantage of the MIDEBANK on CD-ROM (among many other technology opportunities), what technological counter-advantages do the students in New Prague have? In the realm of CD-ROM, our middle school students use Compton's *Electronic Encyclopedia* and Microsoft *Bookshelf* on IBMs. For the Macintosh, students enjoy the Grolier *Electronic Encyclopedia*, a variety of Discis Books, Voyager's *Beethoven's 9th Symphony* CD Companion, *Cosmic Osmo*, *Time Table of History*, Software Toolworks *World Atlas*, and Wayzata's *GEM* Vol. 1. We intend to set up a Mac network to allow better access to the CD-ROMs. We also have a six-disk CD-ROM jukebox for the Macintosh, accessing multiple disks without needlessly switching CDs.

Over the past two years at the New Prague Middle School (NPMS), we've been making an important transition to Macintosh LCs. A mini-lab of five Mac LCs and two IBM-PCs are available in the Media Center for students and teachers. In the Media Center, we produce a newsletter for parents called *Crossroads* and the student newspaper *Hightops* using Aldus *PageMaker* on the Macs. Other NPMS teachers are just starting to jump on the Macintosh bandwagon.

In moving towards more Macintoshes, we're not forsaking the Apple IIe or the Apple IIGS; Rather, we're trying to make the best use of them for our students. We have a IIe lab networked to a hard drive containing all MECC software programs

(135 programs), public domain software (approximately 140 programs), and TIES keyboarding software. We have smaller IIe labs in the Media Center, Science Room, and 5th and 6th grade levels, networked to the main lab for access to software. We also have four Apple IIGS computers, which are especially useful in using *VCR Companion.* With it, we create video titles for a weekly news program, produced in the Media Center.

The District made a decision to furnish the elementary school with a lab of Mac LCs, along with Macs for all teachers. It was a difficult decision since our middle school and high school also felt strongly (to put it mildly) that they should get the Mac lab. But it appeared that the best way for students and teachers to experience computing was to start at the earliest levels and work up towards the higher grades. As always, here in New Prague we're left craving more and more Macs. We're also left to ponder the state of our technological affairs in comparison to other school districts ("are we ahead of other districts, behind, the same?"). We try not to get too stimulated with ideas from magazines such as *MacUser* and *Macworld.* We try not to become too excited when other districts casually show off their Mac labs (on each end of the building...). We read the *Apple Library User Group Newsletter* and *Macintoshed Libraries* studiously, searching for new ideas and helpful suggestions to keep moving through the technological quagmire, lest we sink into oblivion. Keeping up with the Joneses? It's a matter of educational survival.

Keith Johnson works in the best of all possible worlds at the New Prague (Minnesota) Middle School Media Center (NPMS). Still, he pines for more Macintosh computers in his operation. Keith realizes (rationalizes?) that it's quality, not quantity that counts. Besides his media duties, he coordinates a weekly TV student news show, as well as a newsletter for parents and a student newspaper at NPMS. Spare Macintoshes, peripherals, advice and inquiries can be sent to Keith at the New Prague Middle School, 405 1st Ave NW, New Prague, MN 56071. Phone 612/758-2586.

The Chemist's Crystal Ball

Merri Beth Lavagnino & Kimberly Parker

INTRODUCTION

Prior to beginning the *Chemist's Crystal Ball* project, the Chemistry Library at Yale University emphasized traditional library resources. The only computerized service available in the Library was access to the Yale University online catalog via a terminal. The field of chemical research, however, is becoming increasingly dependent on electronic information services, as well as on communication and collaboration among colleagues. It was our desire to promote awareness and use of electronic chemical information and communication tools, and to lower the barriers to these resources by providing easy access to them. In this paper we describe the steps we have taken in the development of the *Chemist's Crystal Ball*, our name for the chemical information workstation we developed in the Chemistry Library with support from the Apple Library of Tomorrow grant program.

Deciding on Conceptual Issues

Our ideal design for the *Chemist's Crystal Ball* was to create a single place to do many different electronic activities. We imagined a scholar's workstation in which the user sits down at the machine and is instantly able to access a database to look for information on a topic, find the article citations he wants, download them into his personal citation database manager, and request them from his library (not caring whether they are there or must come through interlibrary loan). From this same interface, he could check the weather forecast, pull up electronically the menu at the dining hall before going to lunch, write a grant to do research on a new topic of interest (incorporating paragraphs elicited electronically from a colleague), manipulate a chemical structure drawing program, and so on. We liked the principle that from one interface a user would be able to retrieve information, manipulate it, and output it, without having to "switch gears."

We also had to keep in mind that for most of the day, there is no librarian or staff member present in the Chemistry Library. For this reason, one of our first decisions was to *create an information resource that would be as easy to use as possible*. We assumed researchers do not use electronic resources with complex logon procedures, so we wanted the interface to handle logon procedures automatically. We also assumed that resources were not used because the user is frustrated by navigating for applications on a given computer. We therefore decided to integrate all of the applications by locating them in a single interface. Ideally, to make electronic resources even easier to use, we would create a generic interface to all the applications so that they would appear the same on screen. But we knew that this would involve a great deal of development work, and we needed to *create something quickly*. We chose not to create a generic interface, but rather to create an integrating tool for easy access to all of the applications. Unfortunately, once the user launches an application, he has to know the internal commands of the software and databases in use. But we felt that this was acceptable, since a generic interface might create a helpless researcher trying to use the same information resources from another kind of workstation.

We were aware of similar projects being developed at the Yale Medical School and at Yale's Department of Computing and Information Systems. Our design group felt that we should try to *create something that could be compatible with these projects*, since such a goal was likely to be desired in the future. After brainstorming on several different designs, including one that used the chemical reaction pathway to lead the user to the correct application, we decided to base the *Chemist's Crystal Ball* on a prototype designed for the Yale Medical School (Fig. 1).

This design uses *HyperCard* with a simple two-layer menu system to reach the desired application. By adopting this prototype, we could meet our goals to create an information resource that would be easy to use, require little development time, and maintain compatibility with other Yale projects. Our design for the *Chemist's Crystal Ball* main menu screen is slightly different from the project at the Yale Medical School (Fig. 2).

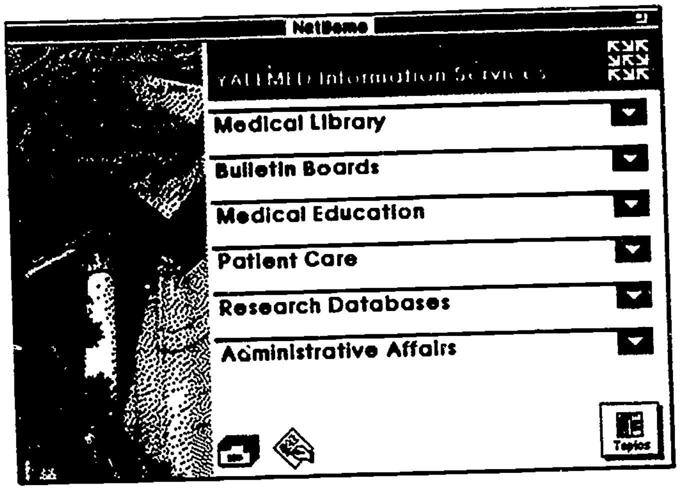


Fig. 1: The *Chemist's Crystal Ball* at Yale University was based on a prototype designed for the Yale Medical School.

In order to promote awareness and use of electronic information sources, we decided to place one workstation in the Chemistry Library, one in a chemistry faculty member's office, and one in a chemistry laboratory. We hoped that by locating equipment close to the site of chemistry faculty and student labs and research areas, we would increase the usage of electronic chemical information resources.

Development of the Software: Phase I

The offices of the principal designer of the software, Kimberly Parker, and the HyperTalk programmer, Merri Beth Lavagnino, were in separate buildings located at a distance equal to a twenty minute walk. For this reason, we worked in segments. Workstation hardware provided by Apple was installed in each office, and Kimberly began by altering the visual design of the existing *HyperCard* prototype created for the Yale Medical School's project. This involved changing most of the icons to reflect the *Chemist's Crystal Ball* image, since the prototype was geared towards the medical sciences, as well as creating additional chemical-related screens, such as new help screens. Then Kimberly passed on the revised software and her design notes to Merri Beth, who modified the scripts to change the contents of the main menu and submenus to match Kimberly's design. The Medical School prototype had menu items for clinical applications that weren't necessary for our chemical version, and we needed to match the submenus to the software provided by Apple. Submenus, displayed when the

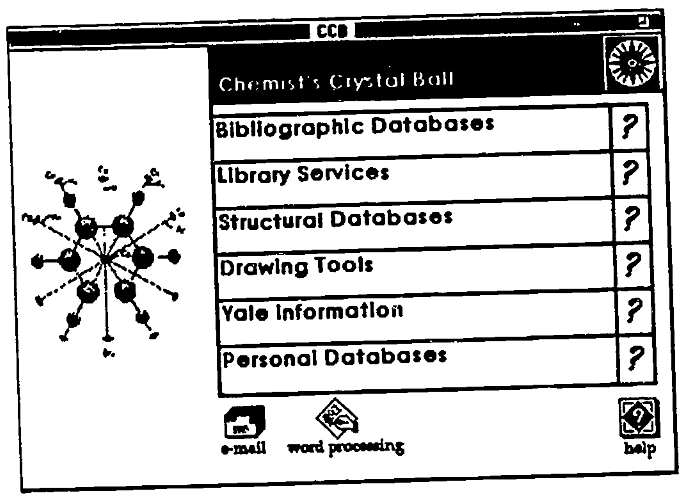


Fig. 2: The main screen for the *Chemist's Crystal Ball* provides six main menus, each containing a variety of submenus for the user.

mouse is held down on a main menu item, provided access to a variety of specialized applications, databases, and electronic resources (Fig. 3).

After Merri Beth changed the menu items, she loaded each software application on her computer and altered the appropriate scripts to open applications upon demand from the menu. Menu items not highlighted were designated for future service, with appropriate funding. For access to remote databases and for electronic mail access, logon batch files were written, using various communications paths. The *HyperCard* scripts were changed to launch the appropriate logon file when a menu item was chosen. The grant team met often to review the progress of the design, and as suggestions for alterations were made, the program was passed back and forth between Kimberly and Merri Beth to make changes in their appropriate domains.

We installed the Phase I *Chemist's Crystal Ball* workstations on August 1, 1990 in a chemistry lab and on August 6 in a chemistry faculty office.

DEVELOPMENT OF THE SOFTWARE: PHASE II

After our initial elation at getting two of the workstations installed and working, we settled down to working on Phase II — installing a third workstation in the Chemistry Library. We gradually began to realize that this would not be as easy as originally planned. We needed devices to secure the hardware, since the Library is not always staffed. Also, because the library version is available for anyone to use, we needed more software security on the computer to block both inadvertent and intentional misuse. We wanted to lock the *HyperCard* user into a level in which changes would not be allowed to our application. We also wanted to hide the *HyperCard* menu bar, to prevent users from leaving the interface and accessing communications software. Our basic fear was that the patrons would discover sign-on passwords for our library funded searching accounts. Instead of having the interface log on directly to remote fee-based databases — like the office and lab computers — we realized we needed to insert an interface, asking for a user password. The password could be obtained from the Chemistry Librarian as soon as the user received training in database searching, in order to encourage cost-efficient techniques. These changes were made, and Phase II — installation in the Chemistry Library — was completed on October 8, 1990.

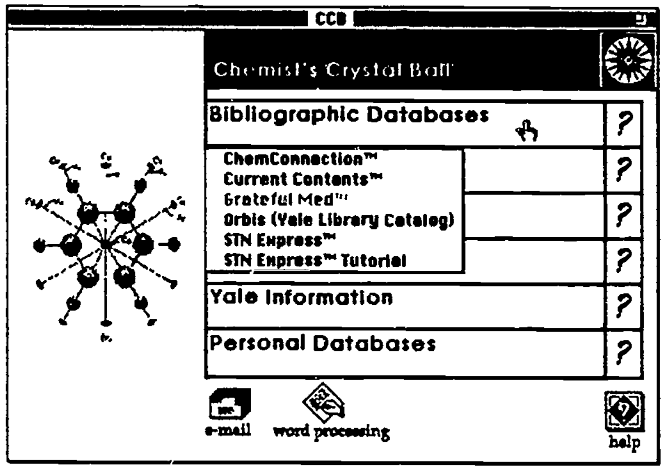


Fig. 3: A submenu for the Bibliographic Databases menu reveals access to *ChemConnection*, *Current Contents* and other resources. The shaded *Grateful Med* is not currently available.

Use of the Chemist's Crystal Ball

Prior to the installation of the *Chemist's Crystal Ball* workstations and software, chemists at Yale were not linked to the campus AppleTalk network. These workstations now give chemists instant access to all electronic services available on campus, including electronic mail; file sharing; the *Current Contents* database; the campus information service which lists, among other things, the weather and the course catalog; and the online catalog of the Yale University libraries. They can, through electronic mail, make book recommendations for the library collection; request a book or article through interlibrary loan; ask for a photocopy of articles held at Yale; or make a reference request. Information management applications include Microsoft *Word*, Claris *FileMaker*, and *Pro-Cite*. In addition, they now have access to online database searching through STN International, a scientific and technical information network, and to the chemical structure drawing programs *Chem3D* and *ChemDraw*.

The Future

We plan to continue to add functionality to the *Chemist's Crystal Ball* workstations with additional funding for expansion of online services and for purchasing additional specialized communications software. We have also begun to develop a re-configurable, or personal, version of the interface in order to overcome some of the problems with different versions on the lab, office, and library computers. During this process, we have had to consider whether or not we *want* to have a re-configurable version. A tension exists between the individual needs of specialists and the easy maintenance of the software. We have also asked ourselves if it is possible or even desirable to have a single, integrated product for many functions and applications if those functions and applications change among individuals. Keeping these issues in mind, we have abandoned a prototype of a *totally* re-configurable version we had been working on to pursue a *partially* re-configurable version, which we feel will meet the individual needs of specialists as well as address most of the maintenance problems.

Merri Beth Lavagnino was Assistant to the Head of Library Systems at Yale University. She is now Head of the Systems Department for Libraries and Media Services at the University of Vermont, Burlington, VT 05405. Merri Beth can be reached on the Internet at mlavagni@uvmvm.uvm.edu, by phone at 802/656-1369 or by fax at 802/656-4038.

Kimberly Parker is Chemistry Librarian at Yale University. She can be contacted at the Kline Science Library, Yale University, 219 Prospect Street, P.O. Box 6666, New Haven, CT 06511, or 203/432-3439 (voice), 203/432-3441 (fax), or the Internet at Kimberly_Parker@yccatsmtp.ycc.yale.edu.

The San Diego Supercomputer Center (SDSC) is one of four high performance computing centers funded six years ago by the National Science Foundation to provide supercomputing capabilities to the academic community. The current computing centerpiece is a Cray Y-

Macintosh in a Supercomputer Library

Mary Layman

MP, but the Center also boasts powerful parallel processing machines from Intel and Ncube. DEC, Amdahl, Sun and other computer companies are represented in the Center's collection of machines. Nevertheless, Macintoshes are used by almost everyone in the Center, including the Library, for a great deal of day-to-day work.

The SDSC Library staff spend a large portion of everyday using various Macintosh applications. In the past two years the Library's Mac allocation has grown from a Macintosh Plus to a Mac SE with large screen along with a Mac IIci. The Mac SE is located at the Reference desk for the exclusive use of Library staff. It is attached to a Radius large screen monitor; an accelerator board is also installed in the computer. The Macintosh IIci, with 16 MB of RAM, runs multiple applications at the same time, including the Library catalog and specialized scientific packages. It is heavily used by both staff and visitors.

All correspondence is prepared on Microsoft *Word*. Dialog searches are performed on the Mac, edited through *McSink*, and printed or mailed electronically. The University of California San Diego's Roger catalog, as well as UC's Melvyl system are accessed with the use of Telnet. Searches in these online catalogs are captured and printed or forwarded electronically. Additionally, through the regional network CERFnet (headquartered at SDSC), the Library uses Internet to electronically examine other library collections, "FTPing" information as needed.

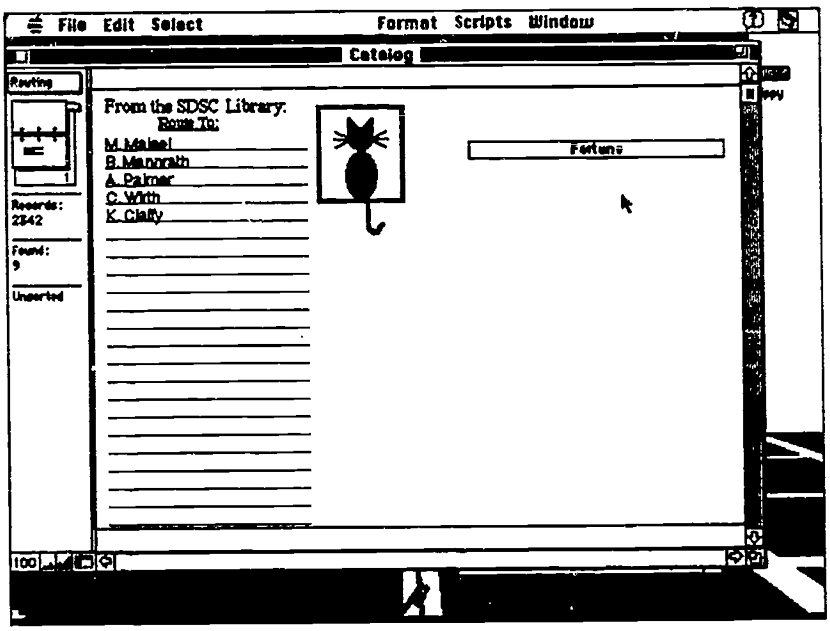


Fig. 1: *FileMaker Pro* is used to generate routing slips, printed and attached to journals distributed in the Center.

The Library's lifeline, in many senses, is the Macintosh. Word processing, electronic mail, online searching, Internet access, and catalog production are all Mac-based. The SDSC electronic mail system, the main communications outlet for the staff, allows the Library to send notices and newsletters and receives service requests. A recent addition to the Library's Mac software collection is *Eudora*, a user-friendly electronic mail package, negating the need to deal with VMS on the VAX. *Eudora* has made transferring messages and files a lot easier.

FileMaker Pro has helped the SDSC Library create a number of useful and even exciting files for patrons and staff. The Library had, at one point in time, its catalog in a database on a DEC VAX. This catalog was not available to the staff at large and was difficult to use. When the decision was made to move the Library catalog to the Macintosh platform, we decided to use *FileMaker Pro*. Screens were designed for the catalog, with separate layouts for journals, the creation of bibliographies and journal routing slips (Fig. 1). Other modules were designed for

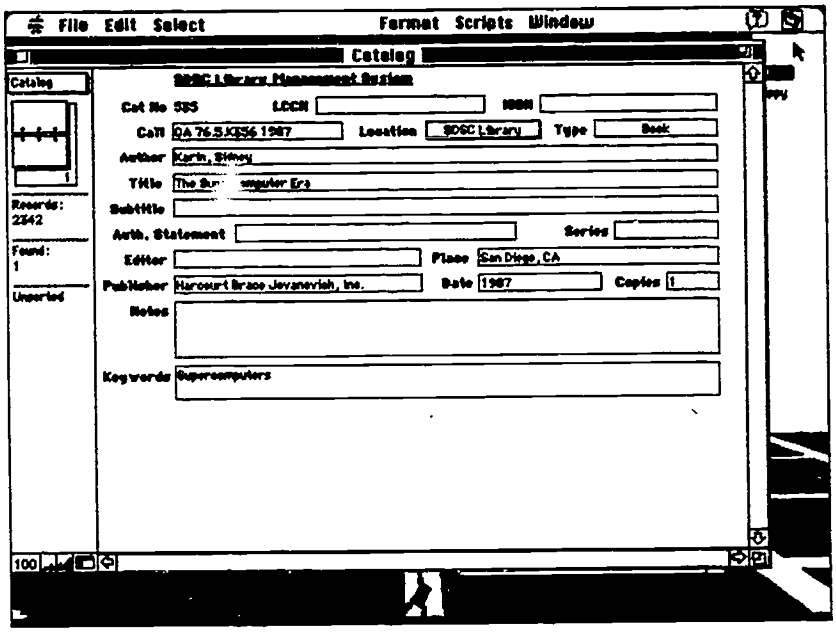


Fig. 2: The Library catalog was originally isolated in a DEC VAX in the Center. *FileMaker Pro* was used to create a new catalog in about a day, accessible over the Center's network of Macintoshes.

orders, patron names and circulation records. These components were developed in a process that took, with the assistance of a *FileMaker Pro* expert, about a day. The original VAX database was transferred to *FileMaker Pro;* after some editing, the catalog was ready (Fig. 2). In addition to being available on the Macintosh in the Library, thanks to the Center's local area network, the catalog is accessible by anyone at SDSC with a copy of *FileMaker Pro* on his/her office Macintosh. The catalog runs continuously (hidden in the Window menu) on the Mac IIci.

In addition to using *FileMaker Pro* for the Library catalog, two special collections have also been cataloged with this application. SDSC is home to a state-of-the-art computer visualization laboratory. Images produced through computer graphics and simulation are available to requesters in slide form. The catalog for this collection is called *ImageBank.* Each entry includes a description of the graphic (designer and software base) along with an electronic mail address (Fig. 3). With this address, the Library can dial into a particular computer from the Macintosh and order a reproduction of a given slide.

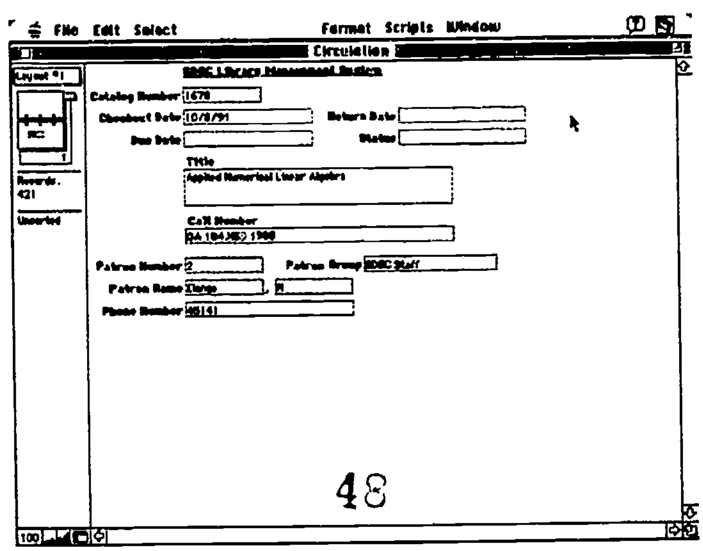


Fig. 3: The Center, through its computer visualization lab, creates state-of-the-art computer graphics and simulation. The *FileMaker Pro* catalog called *ImageBank* makes this collection of unique graphics available to users, allowing the Library to easily process and track requests for images on slides.

The *ImageBank's* connecting modules in *FileMaker Pro* allow the Library to print a receipt for a requester and keep track of the number of slides requested.

Another collection organized on the Macintosh with *FileMaker Pro* is *PhotoBank*. It is a database to access the archival collection of photographs and slides covering the history of the Supercomputer Center, from the first ground breaking ceremony to the last Halloween party. Again, screens and layouts are designed to describe the collection and locate a particular item.

SDSC Library is happy to provide anyone with the templates to the catalog, *ImageBank* or *PhotoBank*.

Two more uses for the Mac are planned for the near future. The Library plans to initiate an electronic newsletter in 1992. Also, we have acquired the Grolier *Electronic Encyclopedia* CD-ROM and plan to make it available to staff and patrons. With Macintoshes and CD-ROM drives in the Center, we have begun a project to identify compact disc products which might be of use to SDSC staff.

The Library of the San Diego Supercomputer Center is truly Macintosh-based. The computers have permitted a small, part-time staff to provide a full range of services and information access in an efficient and easy manner.

Mary Layman has been a librarian for 13 years. She has worked in special, public and academic libraries, and has been using Macintoshes for two and a half years. She currently holds two half-time positions — Librarian at the San Diego Supercomputer Center, and Associate Librarian in charge of corporate programs at the Library of the University of California at San Diego. Letters will reach Mary at the San Diego Supercomputer Center, General Atomics, P.O. Box 85608, San Diego, CA 92186-9784. Phone: 619/534-5171. Internet: laymanm@sds.sdsc.edu.

The Library is Not a Place

THE PROBLEM

“What did the Irish wear back then?” “What did the houses look like?” “When was gale day?” “What did they have to eat besides potatoes?” “Was farming the only work?” “How much was the rent?” “What did the immigrant ships look like?” “What did they take with them?” Twenty-five eighth graders were two weeks into their unit on the famine immigrants from Ireland; the Hopkinton High School Library was feeling the strain.

in which our heroes encounter a problem, have a brilliant idea, write a grant proposal entitled **Building the Virtual Library**, *are funded, and begin work*

Shelley Lochhead & Lawrence Bickford

SOME BACKGROUND

The questions come from a program called *Immigrant.* It is a nine week multi-disciplinary unit that combines history and sociology with computer applications, mathematics, writing, research, and what can only be called high theatre. Each *Immigrant* student adopts the persona of an Irish immigrant in the 1840s and, using the word processor, writes a diary which tells that immigrant's story — the misery of famine-stricken Ireland, the hardships of the journey to America, and the difficulties of starting over in "no-Irish-need-apply" Boston.

The simulation is realistic and exciting thanks to the high degree of authenticity achieved through computer technology, research, and experiential learning. *Immigrant* is infused with historic detail, including actual ships' passenger lists and databases of jobs, housing, transportation, food prices, and clothing prices. Details of the historical picture also emerge from classroom discussions and from experiences orchestrated by the teachers. Foremost among those experiences is an overnight re-creation of the 1840 sailing voyage to America, complete with costumes and stage flats, crowded quarters, weevils in the biscuits, and many of the sights and sounds of an ocean crossing in steerage.

Now in its fifth year in the curriculum, *Immigrant* is, by its very nature, a resource-based unit of instruction; the authenticity of the simulation is entirely dependent on the quality and amount of historical resources. Thus far, there is still much that we cannot provide to our students. Actual immigrant diaries, pictures of the people and places of the times, issues of the *Boston Pilot* (a newspaper for and about Irish immigrants), boarding house rules, maps, articles in the Irish press detailing the "clearances," and other such material are all important in terms of making *Immigrant* come more to life for our students.

The Brilliant Idea

How could a small school library offer such depth of information on so narrow a topic? Online searching of commercial databases, and numerous interlibrary loan requests still left us lacking. The information we wanted was in far-off universities, specialized collections, small museums, and other sites generally inhospitable to an eighth grade clientele.

Enter technology. Using a scanner, wouldn't it be possible to visit those locations, collect copyright-free documents from the period electronically, bring the computer files back to school, and make them available to students? (Fig. 1) We envisioned a day when students could sit at computers, writing their diaries, and see on their screens a map of Boston circa 1840, or pages from a real immigrant diary, or the floor plan of a typical flat, or the cross-section of a sailing ship — anything, in other words, that would enhance their sense of history (Fig. 2). This access to information would provide the student, whether working in the computer lab or in a classroom or in the library itself, with a "virtual library" of historical information at his or her fingertips.

The Proposal

The Apple Computer Library of Tomorrow program funds innovative uses of technology in libraries. Using a scanner to collect documents for a virtual library seemed innovative to us, so we decided to write a proposal. Thus began months of lunches in the computer lab as we pored over drafts, tossed around ideas, refined the plan and squabbled over syntax. We started in November, worked nearly every day, finished up in March, and waited. The good news arrived in June, and the virtual library was under way.

Technology supports the project in three areas — in collecting the materials, in enhancing the electronic files, and in making those files available to one and all. At the center of the grant proposal are two mobile data-capture workstations, each consisting of a Macintosh Portable and a scanner. We requested two types of scanners: a flat-bed, which looks much like a photocopy machine; and a hand-held, which resembles a lint brush. Between them, they can handle most text

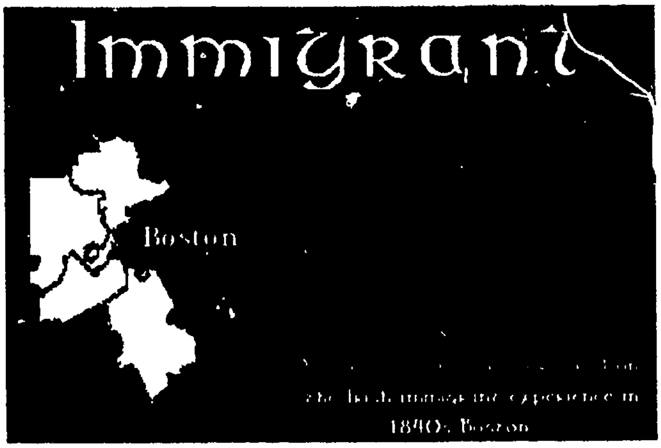


Fig. 1: The development of a *HyperCard* front end is an important part of *Building the Virtual Library*. Stack construction is barely underway, although this is likely to be the opening card of the *Immigrant* stack

and graphic materials with no risk of damage to the original.

Many of the document files need work before they are suitable for use. Scanners, like photocopiers, take pictures. But a picture of text is not nearly as useful as word processed text, which allows for searching and copying. Optical character recognition (OCR) software performs the necessary conversion by studying the picture, identifying the letters one by one, and dumping the result into a word processor. Graphic images also need enhancement — but not, we hasten to add, at the expense of historical accuracy. Our intent is to electronically clean up the dust spots, wrinkles, and torn corners, and then optimize the image for on-screen rather than paper presentation.

Perhaps most important of all is making the computer files accessible to students. This we do through an AppleShare network connecting the library, several classrooms, and the computer lab. Because the files can be read (and only read, not modified) by several users at once, an entire classful of students can view the same document simultaneously. Suddenly, we have the capability to take information from remote locations inaccessible to eighth-graders and put it on almost any computer screen in the building.

The Work

Don't think for a minute that we are doing all of this work ourselves! When school opened in September, we recruited a research team. Five students, ranging from ninth grade to twelfth, responded — Beth, Bill, Kelli, Kristen, and Stephanie. They have spent the first half of the school year mastering scanning, image enhance-

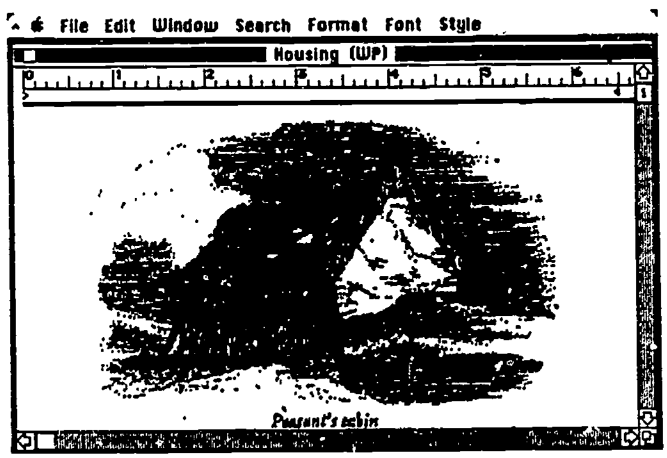
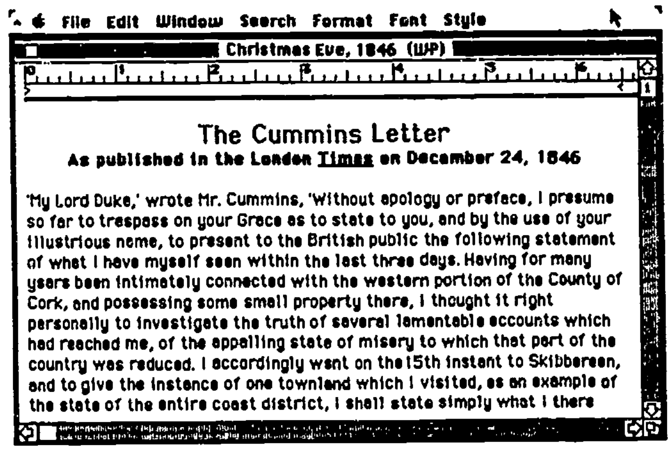


Fig. 2: An early engraving captured with an Apple Scanner using *HyperScan* software. Despite an unremarkable appearance on paper, its screen presentation is quite impressive. Source information follows the illustration, but is not visible in this illustration.

ment, and OCR software; and at this writing they are champing at the bit, ready for the first off-site scanning trek. As part of their independent study, they have also spoken before our local teachers' association, and have created electronic portfolios of their work to date. From the portfolios, we have gathered the first elements of our virtual library — an excerpt from the diary of Gerald Keegan, an engraving of a famine funeral at Skibbereen, and articles on clothing, a typical cotter's expenses, and the work-house diet. These documents and pictures are already having an effect on our *Immigrant* students.



The Cummins Letter

As published in the London Times on December 24, 1846

'My Lord Duke,' wrote Mr. Cummins, 'Without apology or preface, I presume so far to trespass on your Grace as to state to you, and by the use of your illustrious name, to present to the British public the following statement of what I have myself seen within the last three days. Having for many years been intimately connected with the western portion of the County of Cork, and possessing some small property there, I thought it right personally to investigate the truth of several lamentable accounts which had reached me, of the appalling state of misery to which that part of the country was reduced. I accordingly went on the 15th instant to Skibbereen, and to give the instance of one townland which I visited, as an example of the state of the entire coast district, I shall state simply what I there

Fig. 3: The text of this early "letter to the editor" describes the horror in Skibbereen during the famine. It was scanned using Caere's *Typist*, and saved as a Microsoft *Works* document.

A Vignette

Hunched over a keyboard, Julie Davis describes her life as a baker's wife in famine-stricken Ireland, 1847. The keystrokes come quickly at first, but slow to a crawl as she struggles to describe the awful conditions. Finally, her fingers at a standstill, she asks her teacher, "Mr. Bickford, how bad was it really?" Rather than answer or give her a book on the subject, Julie is directed to a folder called *Immigrant Library*. "Read the file called Christmas Eve, 1846. It's an eyewitness account, published in the *London Times*." (Fig. 3)

Staring into the screen, she reads the actual words from 150 years ago:

"... Being aware that I should have to witness scenes of frightful hunger, I provided myself with as much bread as five men could carry, and on reaching the spot I was surprised to find the wretched hamlet apparently deserted. I entered some of the hovels to ascertain the cause, and the scenes which presented themselves were such as no tongue or pen can convey the slightest idea of. In the first, six famished and ghastly skeletons, to all appearances dead, were huddled in a corner on some filthy straw, their sole covering what seemed a ragged horsecloth, their wretched legs hanging about, naked above the knees. I approached with horror, and found by a low moaning they were alive — they were in fever, four children, a woman and what had once been a man. It is impossible to go through the detail. Suffice it to say, that in a few minutes I was surrounded by at least 200 such phantoms, such frightful spectres as no words can describe..."

Her imagination rekindled, Julie types:

"William and I woke up quite early and went down to the bakery to bake a loaf of bread to take with us on the long trip. We baked the bread with the last bit of flour that we had, which we had been saving ever since we made the decision that we would be

leaving. As the bread started to rise, it gave off a wonderful smell. People out on the streets were gathering at the window at the smell of fresh bread, which had not been in the air for about a week now.
It was dawn and the sun was coming up right behind our bakery. The air was cool and brisk. I looked at the people with the first morning light on the faces and I was aghast. The people outside on the street were starving and clawing at the window and door. Their faces were downcast and their cheeks were hollow. Their eyes seemed to be set back in their head, and when I looked into them, it was like I could see their whole lives before me. I could see all the problems that they had gone through. Among the throng of people I saw a child hanging onto her mother, now a skeleton for lack of food. The little girl started crying. Suddenly William turned me from the dreadful scene and embraced me. I started crying. Couldn't England see what was going on here? Couldn't they see what was happening? I know why William turned me away from the awful scene, to protect me. But it was too late. I already had the horrid scene engraved in my mind. I will never forget that as long as I live." (excerpt from an immigrant diary by Julie Davis, Grade 8, Hopkinton Middle School)

Lawrence Bickford, pictured on the left in a standard-issue network administrator's outfit, is the computer coordinator for Hopkinton High School. A co-developer of the Immigrant unit, he also teaches math and science. He bought his first Macintosh in 1984, and has been out of control ever since. Lawrence can be reached at Hopkinton High School, Park Avenue, Contoocook, NH 03229. Phone: 603/746-4167 x248. AppleLink: NH.BICKFORD

Shelley Lochhead, shown on the right in her preferred teaching attire, has been the Librarian at Hopkinton High School since 1975. Past-President of the New Hampshire Educational Media Association and vintage trouble-maker on the library scene, she resides in Contoocook, NH, where she also gardens, plays the banjo, and keeps cats. She can be reached at Hopkinton High School Library, Park Avenue, Contoocook, NH 03229. Phone: 603/746-4167 x230. AppleLink: ALOT32. Well: lochh

Acknowledgement: We thank **Lars Hogblom,** a student at Hopkinton High School, for his help. Without his clever artistry, those Vikings wouldn't look like us at all!

54

Profiting From The Macintosh

Investments in an Electronic Library at Southwest Missouri State University

Libraries are facing an ever increasing demand for information services during this period of decreasing fiscal resources. Additionally, rapidly emerging electronic information formats require collaterally expensive new hardware. The libraries at Southwest Missouri State University (SMSU) are responding to these challenges in a unique manner which offers savings, state-of-the-art hardware and even revenue generation — we not only *use* but *sell* the Apple Macintosh! In this unique role since July 1989, the SMSU Libraries are the designated

John M. Meador, Jr.

Apple authorized campus reseller of Macintosh computers and peripherals as well as Claris software. This contract permits us to purchase Apple products at significant discount direct from Apple. We resell them to qualified students, faculty, and staff at sales prices averaging 40% below Apple's suggested retail price. Apple pays for most advertising on campus; a local Apple authorized higher education dealer provides technical support, software training and warranty repair service for our customers. This is a win-win situation for all parties — Apple, the Libraries, the local dealer, and of course the campus community.

Profits from Macintosh sales provide the Libraries with funds to purchase hardware and software for staff and patrons. A Macintosh is on every librarian's desk. CD-ROM products such as ERIC, PsycLIT, and CINAHL are in Reference along with electronic tools such as the Grolier and Random House Encyclopedias. A public access Macintosh lab provides free ImageWriter printing. Two "teaching" Macs on carts are available with multimedia peripherals and projection devices for use in library classrooms. Desktop publishing is possible in the Library Media Department. The Music Library's collection includes multimedia programs such as Voyager's *Beethoven Symphony no. 9*. A "circulating" Macintosh Portable, with modem, allows Library staff to compute at home.

The self-supporting sales area, called the Macintosh Education Center (MEC), is a remodeled typing room on the Library's main level, staffed 20 hours a week by a MBA-seeking graduate student. The latest Apple hardware is on display — such as the PowerBooks, a Macintosh Quadra 900, an Apple 21" Color Display, an Apple OneScanner and a LaserWriter IIg. The MEC serves as a non-threatening introduction to computing for wary students. On the other hand, faculty and "power users" frequently drop in to keep abreast of the latest developments such as *QuickTime*. Additionally, MEC provides to the SMSU community laser prints and scans for a nominal fee.

Hardware alone, however, does not make a library truly "Macintoshed." Creative applications, developed and adapted by librarians solving professional problems, truly highlight the oft advertised Apple advantage. Utilizing *HyperCard* — that silly putty of the software world — user-friendly interfaces and interactive learning exercises are being developed in libraries across the country. Librarians at SMSU first learned of it from colleagues at Texas A&M University, where a *HyperCard* front-end to NOTIS, entitled *MacNOTIS*, was invented. It reformats NOTIS screen displays into a graphic interface allowing links between bibliographic records and a Library's floor plan. Fortunately, our Apple sales representative managed to include SMSU among a small number NOTIS sites to receive training on *MacNOTIS* in 1989. We subsequently adapted our own version of *MacNOTIS* for demonstration purposes but, for a variety of reasons, have yet to distribute it for campus-wide use.

This experience with *MacNOTIS* served as the catalyst for SMSU librarians to embark upon a series of software development projects. Frustrated by poor interfaces to commercial electronic media, we turned to *HyperCard* as a medium for improving upon and customizing these interfaces. Also, SMSU's increasing enrollment and commensurate rise in the student/librarian ratio served as an impetus to develop means by which we could "work smarter" rather than merely harder on tasks such as bibliographic instruction.

LIBRARY TOUR

Like many other libraries with Macintoshes, the SMSU libraries developed a *HyperCard*-based orientation tour with "clickable" floor plans to locate specific services or tools. Descriptive sound bytes make the tour unique. Utilizing Macromedia's MacRecorder to digitize sound, the voices of Library staff were recorded, describing services offered in their units (Fig. 1). Student response to this tour, located on every public access Mac in the Libraries, has been so positive that traditional "walk through" tours have been reduced significantly. Furthermore, voice recognition of the staff by students breaks down some interpersonal barriers normally found at service points and provides recognition from our patrons of the staff. Future enhancement of this tour will undoubtedly incorporate *QuickTime* film clips and potentially make the staff (computer) screen stars!

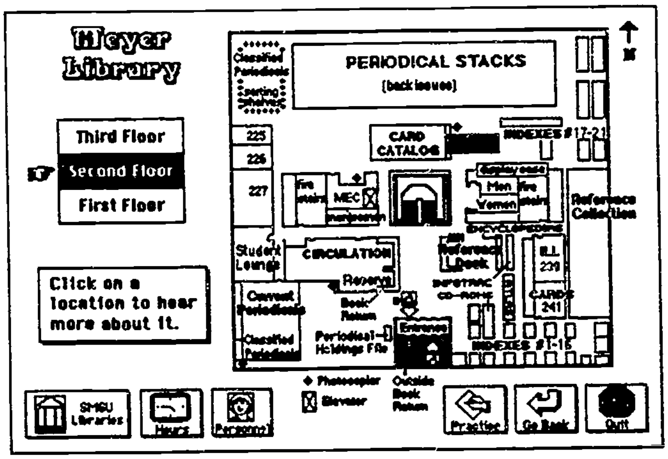


Fig. 1: With Macromedia's MacRecorder, patrons not only understand the geography of the SMSU Libraries in the tour stack but hear Library staff describe their areas.

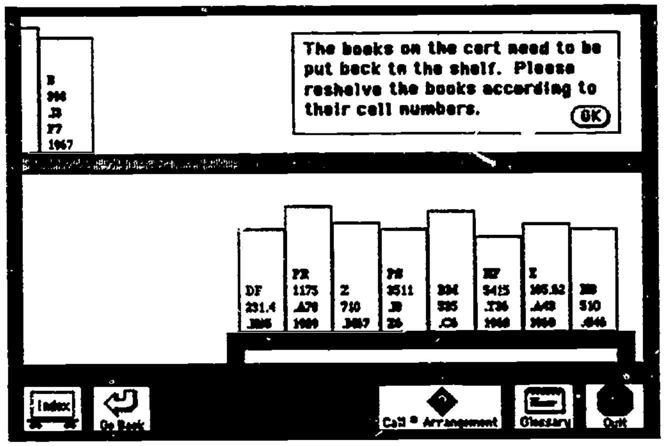
LIBRARY SCIENCE 101

Our major bibliographic instruction endeavor is a 2 MB *HyperCard* stack called *Library Science (LIS) 101.* It was scripted by Dr. Liang Lin during the 1989-90 academic year for use in a one credit hour "Introduction to the Library" course. This interactive program contains segments — on LC subject headings, the formats and arrangements of call numbers, subject search strategies, InfoTrac keyboarding and citations, journal locations — with accompanying practice exercises. For example, imagine a student working through the section on call numbers. A practice session shows a book cart full of books and a library shelf. In the exercise, the student electronically shelves each book by clicking on them one at a time in the proper order (Fig. 2). Each book then moves from the cart to its proper place on the shelf. Errors invoke a dialogue box suggesting to try another book. Other exercises, such as one identifying the components of a bibliographic citation, provide the correct answer whenever an error is made. Also, before ending an exercise, a student can actually print the results and take this report to the instructor.

THE BIBLIOGRAPHER'S WORKSTATION

We needed to bring together and categorize disparate sources of collection development information. This would allow us to facilitate materials selection, collection analysis and budget allocation. We resolved to create a *HyperCard* environment which would serve as a user-friendly and transparent "front-end" for this information. Named the *Bibliographer's Workstation*, the

Fig. 2: In *Library Science 101*, students shelve books electronically by clicking on them one at a time in their proper call number order. An error invokes a dialog box suggesting that the student try another book.

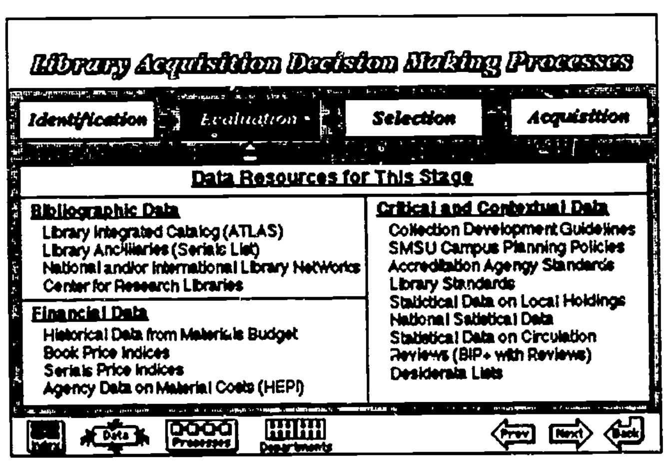


program also uses Microsoft *Word* and Claris *FileMaker Pro* to store local files on a hard drive; telecommunications software links the application to the campus mainframe as well as to the Internet.

There are four elemental steps in library collections development — identification, evaluation, selection and acquisition (Fig. 3). These steps utilize data sets distributed among four groups — *Bibliographic Data, Critical & Contextual Data, Financial Data* and *Commercial Data.* Information in the *Bibliographer's Workstation* is arrayed in "hot" text, utilizing a variety of resources. *Bibliographic Data* includes linkage to the Library's OPAC, ancillary collections, and a means to access remote databases. *Critical and Contextual Data* contains background information for collection decisions — such as accreditation agency standards, campus planning policies, library collections guidelines, and local desiderata files. There are even item-specific reviews from the CD-ROM *Books in Print with Book Reviews Plus.* In *Financial Data,* there are reports on the historical and current status of some forty-five departmental subject funds with national price indices for comparison. *Commercial Data* establishes networked links to both *Books in Print with Book Reviews Plus* as well as vendor databases on the Internet.

The SMSU Libraries are indeed fortunate to profit both technologically and fiscally from the Macintosh. This technology is empowering our librarians and generating an extraordinary level of creativity and professional development. The income from Macintosh sales, in turn, funds their new project ideas. Collectively, 14 presentations at professional conferences and six published papers are directly attributed to in-house development

Fig. 3: The *Bibliographer's Workstation* provides access to collections development information under a single software "umbrella" based in *HyperCard*, utilizing a wide variety of local and remote resources.



activity on the Macintosh. Furthermore, our students, faculty, and staff are the major beneficiaries of this applied research because its focus is the enhancement of library services. Becoming a "Macintoshed Library" was truly a wise investment in the future for Southwest Missouri State University.

John M. Meador, Jr. is Dean of Library Services as well as Professor and Head of the Department of Library Science at Southwest Missouri State University (SMSU). Prior to joining SMSU in 1984, he held administrative library positions at the Universities of Utah and Houston. He can be reached at the Department of Library Science, Southwest Missouri State University, Springfield, MO 65804. Phone: 417/836-4525. Bitnet: JMM924F@SMSVMA. AppleLink: U1273.

Digitized Document Transmission Using HyperCard

Eric Lease Morgan & Tracy M. Casorso

OVERVIEW

A growing demand exists for libraries to provide access to and deliver information in electronic form via ever growing and sophisticated telecommunications networks. The North Carolina State University (NCSU) Libraries in cooperation with the NCSU Computing Center and the National Agricultural Library (NAL) are collaborating on a research and demonstration project to discover and explore issues involved in a NSFnet/Internet-based document delivery system for library materials. As the lead institution, NCSU has developed a sophisticated *HyperCard* application as part of a research initiative entitled the NCSU Digitized Document Transmission Project (NCSU DDTP). The NCSU DDTP is a two-stage initiative investigating the technical and administrative issues involved in the transmission of library materials between remote libraries in stage one and across campus telecommunications networks for direct delivery to the researcher in stage two.

Background

The NCSU DDTP was begun in 1989 as a pilot study with funding from the U.S. Department of Agriculture and expanded in 1990 with funds from a U.S. Department of Education Title II-D research and demonstration grant, an Apple Library of Tomorrow (ALOT) equipment grant and resource support from participating institutions. The project was originally conceived as a research and demonstration project.

The first year of the project was devoted to purchasing and installing equipment, testing network connections among the fourteen participating institutions and developing operational procedures. Initially, participants used four software packages (scanning, compressing, transmitting, and printing software) individually which required an unacceptable level of manual intervention. The project management team recognized early on the need for a front-end driver that would link and/or integrate the four software packages (Fig. 1). It is this need that mandated the development of the project's *HyperCard* application.

Platform

Using networked, unmodified Macintoshes, together with scanners and laser printers located in the participating libraries' interlibrary loan departments, the libraries digitize, transmit and receive in digitized form (including all text and illustrations) library materials requested by researchers. Digitized documents can be delivered directly to a researcher's computer by way of campus networks, placed on diskette, or printed. Printed copies of transmitted materials confirm the marked superiority of this delivery process over telefacsimile for reproducing graphical and photographic information important to scientific publications, such as line graphs and mathematical formulae.

The Macintosh platform was selected as the project's platform of choice because of four compelling technical advantages. First, software packages designed for the Macintosh are interchangeable. Secondly, the Macintosh is consistent and easy-to-use. Third, the system software

Fig. 1: NCSU DDTP Workstation – Hardware and Software Configuration.

NCSU Digitized Document Transmission Project Workstation

Hardware	Software
• Macintosh computer/40 MB HD	• System 6.0.5 or greater
• 8 MB RAM	• StuffIt Deluxe
• Ethernet connection to the Internet	• HyperCard 2.0v2
• Abaton scanner	• MacTCP 1.0.1
• PostScript printer	• Abaton scanning software
	• Telnet for the Macintosh 2.4.4

assumes network access to printers and files. Finally, the platform is open. The project uses the Abaton scanning software to digitize print materials, compression software *StuffIt Deluxe* to compress the digitized documents and *MacTCP* and Telnet for the Macintosh to transfer the files to remote file servers.The project team recognized early on that the process of navigating between separate software packages demanded far too much manual intervention to be useful in a high-volume interlibrary loan environment. A user-friendly interface integrating and streamlining the individual software packages was essential. Together, Eric L. Morgan (Systems Librarian, NCSU Libraries) and Larry Robinson (Programming Consultant, NCSU Computing Center) designed a *HyperCard* 2.0 stack that incorporates a number of XCMDs, compiled pieces of code installed into the resource fork of a *HyperCard* stack. Below is a step-by-step explanation of the *HyperCard* stack's buttons and how the application functions.

DESCRIPTION OF THE APPLICATION'S BUTTONS

The opening screen introduces a *HyperCard* application that has reduced the lending process of scanning, compressing, and transmitting from 20 to 30 steps, to three to five steps (Fig. 2).

From this card, both the lending and borrowing components of the digitized document delivery process are carried out simply by clicking buttons.

The **About** button plays an animated sequence illustrating the process of digitizing, transmitting and receiving library materials. The **Help** button navigates the operator to a help stack complete with hyper-annotations and illustrations. The **Directory** button enables the operator to register new institutions within the Directory file of the database. Included in the Directory file is information concerning each participating institution's computing environment (e.g., most importantly, the Internet Protocol address of the file server receiving documents as in Fig. 3).

To begin the digitization process, the operator launches the application and clicks the **Scan** button. The stack queries the operator for the interlibrary loan request number. The OCLC interlibrary loan subsystem generates a unique identifier for each borrowing request. This number is used as the folder name into which the requested document will be scanned. After the OCLC ILL number is entered as the folder name, the stack queries the operator to identify the borrowing institution's name from the Directory listing. This numbering-naming process is repeated until there are no more lending requests to be processed. Once the folders have been created and named, the Abaton Scanner desk accessory is automatically launched. The operator proceeds to scan the documents and saves the scanned images into the corresponding folders.

The requested documents may be batch processed or processed individually; the only limiting factor is the amount of available hard disk space. A single scanned image is generally a megabyte in size; a nine page digitized journal article requires nine megabytes of memory. Given the immense size of the digitized files, it is necessary that the files be compressed both to save space and to allow for timely transmission via telecommunications networks.

The **Stuff** button automatically compresses (archives) the previously scanned documents with a *StuffIt Deluxe* XCMD. This step is performed automatically because the application records in the borrower's "To-do List" the folder names to be archived (Fig. 3). Once the folders

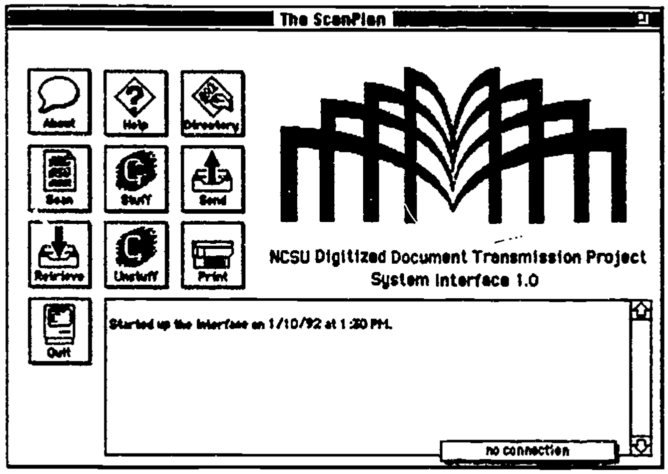


Fig. 2: In the application's opening screen, the Primary Card introduces an application that has reduced the lending process of scanning, compressing, and transmitting from 20 or 30 steps to 3 to 5 steps.

are archived, the "To-do List" is updated, thus indicating the archives are ready for transmission to the borrowing library's file server via the Internet. After the digitized documents have been archived, the uncompressed document is automatically deleted to conserve hard disk space. Only the archived copy of the digitized document then exists.

The Send button automatically transmits the archived documents. It was by far the most complicated button to develop. The application is designed to transmit the digitized documents via the Internet to either an intermediate computer on the borrowing institution's campus network, or directly to a project workstation located in the borrowing library's interlibrary loan department. The transmission process is facilitated with XCMDs from the *MacTCP* Toolkit.

The application transmits the archived digitized documents through the standard TELNET/FTP capabilities of the TCP/IP protocol suite. Depending on the borrowing library's local configuration, the application transmits the archived documents to an awaiting Macintosh or an intermediate file server. For a Macintosh to function as a file server and to receive the digitized documents directly, it must be turned on and running Telnet in the background with FTP enabled. Similarly, any intermediate file server must be turned on to receive documents via FTP. Once the digitized document has been transmitted to the borrowing library, the electronic copy resident on the

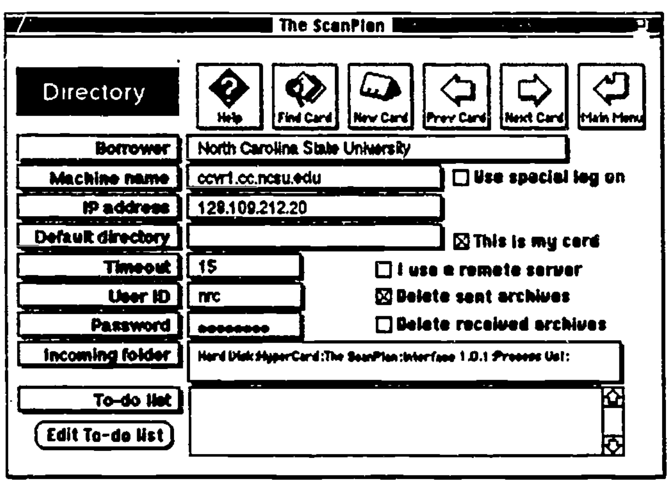


Fig. 3: A sample directory entry provides information about each participating institutions computing environment, including their Internet Protocol address.

lending library's workstation is automatically deleted.

The **Retrieve** button retrieves the incoming archived digitized documents from the borrowing library's intermediate file server. The application automatically logs on to the intermediate file server and provides a list of all the digitized documents. At this point, the operator has the option of selecting any or all of the files to be downloaded. The downloaded archives are automatically marked for decompressing. After an archive has been retrieved from the intermediate file server, the copy resident on the file server is automatically deleted. If the file has been transmitted directly to the Macintosh workstation from the lending library, the application marks the incoming files for decompressing.

The **Unstuff** button reverses the archiving process using *StuffIt Deluxe* XCMD. The application knows which documents to unarchive automatically because the folder names have been recorded in the "To-do List" by the **Retrieve** button.

The **Print** button prints all the unarchived files and deletes them. Because the documents were originally scanned and saved as TIFF images, a custom TIFF-printing XCMD was developed that allows the digitized documents to be printed directly from the folder. Without this TIFF-printing XCMD, it would be necessary to use a paint program to print the file. The digitized documents are deleted after a print copy is produced.

The heart of the application is the "To-Do List". The "To-Do List" is a field in each borrower's card in the Directory that tracks the status of the documents as they are being processed. The format of the "ToDo List" line is [command],[file/folder]. The commands are GET, STUFF, SEND, UNSTUFF and PRINT. Valid files or folders are file or folder names that need to be processed.

The application is very flexible. The application is not limited to a single input mechanism (i.e., the scanner). Any machine-readable file/folder may be imported into the application. The GET command allows for library materials obtained from CD-ROMs, electronic text or image databases, digital video and other multimedia materials to be imported into the application, processed and transmitted.

Delivering the Digitized Library Materials Directly to the Researcher

Stage one of the NCSU DDTP involves the transmission of digitized library materials between the fourteen participating libraries. Stage two is investigating the technical and management issues related to the direct delivery of the digitized materials to the researcher via campus telecommunications networks.

The project team has developed a document server model entitled the Electronic Document Delivery Service (EDDS) that allows researchers on a campus network to retrieve their requested library materials electronically. Using the EDDS, researchers submit their document requests via the campus electronic mail system to the libraries' interlibrary loan department. Requests are filled, through the DDTP sites, by obtaining a scanned electronic version of the article or an original electronic document. Filled requests are received and stored on the borrowing library's intermediate computer, which automatically notifies the researcher that the digitized document is available and provides retrieval instructions for electronic pickup by the researcher. The service is not limited solely to the delivery of journal articles; any type of library information that can be captured in digital form or that already exists in digital form can be delivered over the Internet and across campus networks to the researcher.

The EDDS serves multiple platforms, including Macintosh, DOS and UNIX. Researchers using the Macintosh platform are provided with a *HyperCard* application called *Document Assistant*. This *HyperCard* application is an abridged version of the system application which streamlines for the researcher the process of unarchiving and printing the requested library materials (Fig. 4). It is not necessary for the researcher to have *Document Assistant* to use the EDDS. It merely functions as a user-friendly interface that the researcher has the option of using to unarchive and print the TIFF images, ARIEL system. All systems use digitization technology and the Internet as the primary means of delivery.

The CICnet and RLG systems can be understood as point-to-point, platform independent, print-over-the-Internet systems. They rely on transmitting to identical platforms and have a single input device — a scanner — and a single output device — a printer — both directly attached to the workstation. The NCSU DDTP's system design differs in three key areas from the approach taken by CICnet and RLG. First, the DDTP uses an off-

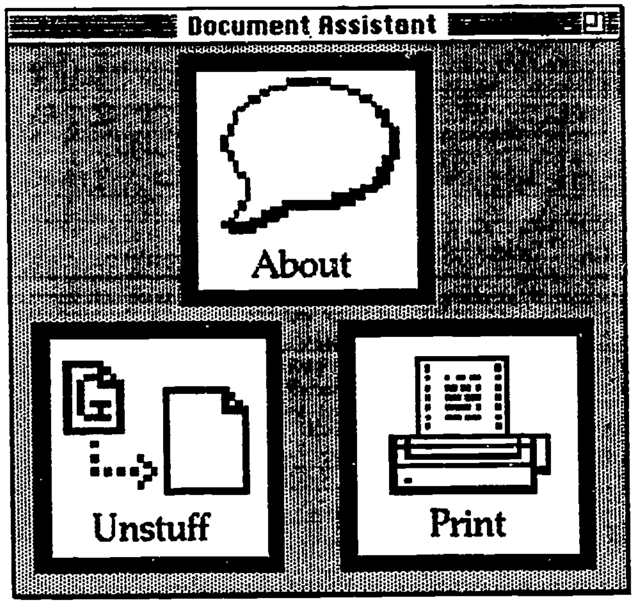


Fig. 4: *Document Assistant* (the Primary Card is shown here) streamlines for the researcher the process of unarchiving and printing the requested library materials.

thus eliminating the need for importing the digitized document into a paint program before to obtaining a print copy.

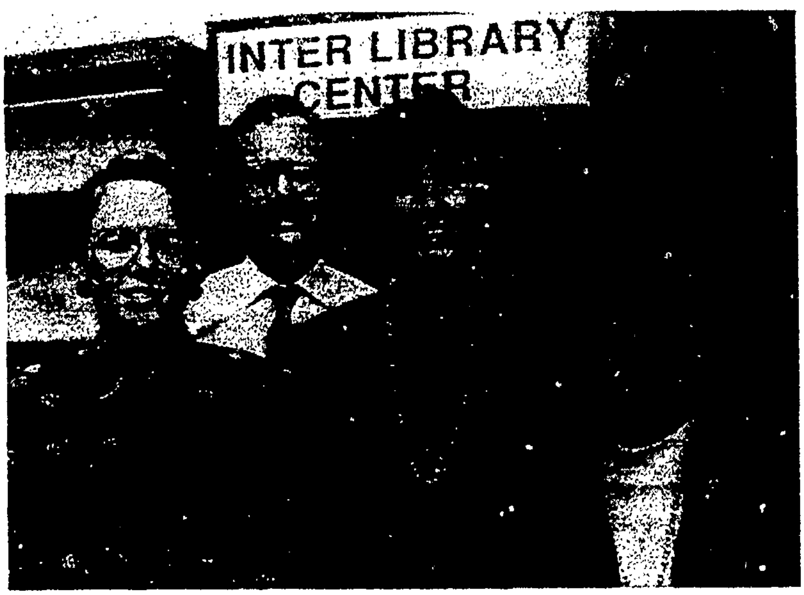
OTHER IMAGE TRANSMISSION INITIATIVES

In addition to the NCSU DDTP, two other image transmission initiatives are experimenting with production-oriented systems using proprietary hardware and software designs — the Committee on Institutional Cooperation Networks's (CICnet) fax over the Internet system and the Research Libraries Group's (RLG) the-shelf workstation configuration with no customization of hardware. Second, by adhering to widely supported data format and transmission standards, the NCSU system is designed to be used in a networked, heterogeneous computing environment. The Macintosh platform used by DDTP is readily integrated, and unlike the CICnet and RLG systems, allows materials to be transmitted via campus networks directly to the researcher. Third, the DDTP provides an "import" function which allows the system to fill document delivery requests for materials regardless of their input source or original format. Print materials can be converted into a digitized form using a scanner, or materials already in machine-readable form — electronic documents, digital sound and video or multimedia materials — can be imported into the system and transmitted. Conversely, the DDTP system can output to any network device, including printers, slide projectors, color printers or any other network-accessible device.

CONCLUSION

Though the goals of the DDTP remain R&D in nature, the project team has extended its investigation to include hardware and software options for achieving production level functionality. At this time, the project team is working in three areas to upgrade system capability — to integrate the scanning software within the *HyperCard* application, to evaluate hardware upgrades to increase printing systems, and, to increase memory capacity to fully utilize the system's batch processing capability. In the future, the *HyperCard* application will support two or three types of scanners and one or two additional types of printers. It is anticipated that with the improved functionality, NCSU system software will serve as the foundation for the electronic delivery of library materials within the land-grant academic community, if not within the library community at large.

The project team is made up of Susan K. Nutter, Director of NCSU Libraries and Principal Investigator; John E. Ulmschneider, Assistant Director for Library Systems; Tracy M. Casorso, Project Manager; Lisa T. Abbott, Assistant Project Manager; Eric L. Morgan, Technical Consultant; and Marti A. Minor, Production Coordinator. The twelve land-grant institutions participating with NCSU and NAL in stage one of the project are: Clemson University, University of Delaware, Iowa State University, University of Maryland at College Park, Michigan State University, University of Minnesota, North Carolina Agricultural and Technical State University, The Ohio State University, Pennsylvania State University, Utah State University, Virginia Polytechnic Institute and State University and Washington State University.



Project team members from left to right: Lisa T. Abbott, Eric L. Morgan, Marti A. Minor, Tracy M. Casorso. Absent: John E. Ulmschneider, Susan K. Nutter.

Eric Lease Morgan, chief architect of the NCSU DDTP *HyperCard* application, is a systems librarian at NCSU Libraries.

Tracy M. Casorso is project manager of the NCSU Digitized Document Transmission Project.

They can be reached at NCSU Libraries, Library Systems, Campus Box 7111, Raleigh, NC 27695-7111. Phone: 919/515-2843. Fax: 919/515-3628. Internet: Eric_Morgan@NCSU.Edu; Tracy_Casorso@NCSU.Edu

I. INTRODUCTION

HyperCard allows Macintosh users to design applications for themselves and their clients, providing a means for ideas to be conceived, developed, and tested in a relatively short time. The resulting stacks employ text, graphics, sound, animation, and hypertextual features.

Designing and Evaluating ARCHIMEDES:

A *HyperCard* Reference Aid at the University of Michigan

Jim Ottaviani and James E. Alloway

HyperCard's utility in libraries is obvious. Librarians with modest programming expertise can develop custom applications. It was in this vein that ARCHIMEDES was conceived in 1989 by the staff at the University of Michigan's (U-M) Engineering Transportation Library (ETL). Funding for the project came from the University of Michigan Library System, and development began in January of 1990. The design, programming, and implementation of the stacks were done completely by the ETL reference staff, which includes both professionals and students.

II. Design Philosophy

Reference is one of the most visible services we provide at ETL. Finite resources translate into finite staffing and hours though, so providing interpersonal service from 8 a.m. to 2 a.m. (our hours during fall and winter semesters) is impossible. The complexity of the University Library system, and ETL in particular, led us to consider alternatives. Among the requirements for an alternative help system were that it provide:

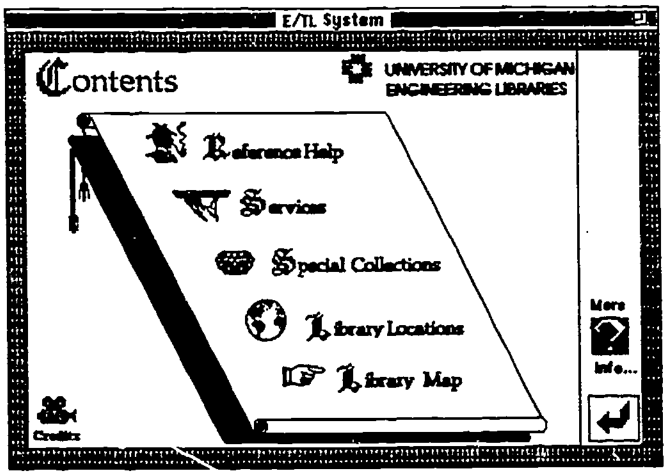


Fig. 1: ARCHIMEDES' main menu provides paths to information on the University of Michigan Library system as well as specific details on the Engineering Transportation Library.

The ARCHIMEDES system has been running since March 22, 1991. It consists of two Macintosh Plus computers linked by a PhoneNet network to a Macintosh SE/30. There are currently seven *HyperCard* stacks that comprise ARCHIMEDES: *ETL System, ETL Locations, Mirlyn, Special Collections, Other Libraries, Reference Help*, and *Services*. ARCHIMEDES covers both general features of the U-M Library system and detailed information tailored to ETL users (Fig. 1). It is designed to provide quick reference help to library users when reference librarians are not available.

- multiple sites/many access points;
- an interactive system that users could use to search for information of their choosing, in the order they chose;
- a visually interesting system; and
- a system we can modify in-house as our needs change.

These and other considerations produced a set of guidelines and a direction for what eventually became ARCHIMEDES.

The selection of topics for inclusion in ARCHIMEDES was based on an analysis of the types of questions by the types of questions and needs our users have. Not intended as a substitute for a reference librarian, ARCHIMEDES instead is a reference aid capable of answering simple, factual questions and providing information about library services. Solutions to common problems (e.g., how to find a missing book, how to best search for conference proceedings) were also included when possible. Developing ARCHIMEDES gave us the opportunity to re-examine our approaches to problem solving. We learned a great deal and revised a few cumbersome procedures. We grouped related topics in separate stacks to allow convenient updating. This modular approach allowed us to revise the *Mirlyn* stack to reflect the changes in search screens resulting from the implementation of NOTIS 5.0.

Most of the development team had little or no programming experience at the beginning of the project. Those who wished to avoid scripting were able to make significant contributions without delving into HyperTalk. Most quickly learned some scripting, however, and were able to add advanced features to stacks. Workshops available at the U-M, through its Information Technology Division, were able to bring those interested in more advanced techniques quickly up to speed.

Design of a human-computer interface, especially in the hands of a mixed group of programmers and non-programmers charged with diverse tasks, is not likely to be successful without guidelines. Apple's *HyperCard Stack Design Guidelines* addresses general issues involved in a hypertext environment.[1] Because we expect the program to be modified for, and operate in, many other libraries at U-M, we drafted a set of guidelines specifically for ARCHIMEDES. They covered cards, buttons, fields, and sounds, and also provided references and sample scripts.

The guidelines served two purposes. When stacks are designed according to specifications, they have a consistent look and feel. When typefaces, special effects, and especially navigation buttons are used consistently, the user is not constantly struggling to learn about a new stack and can concentrate on content. Guidelines also free stack designers from too many choices. *HyperCard's* free-form environment can swallow a creator whole, moving the focus away from providing information in a clear and interesting way.

As part of the guidelines, we produced a *Creator's Stack*. It provides examples of good, and bad, designs that can be copied directly into new stacks (at least the good ones). New stacks can be built quickly using this stack template.

A network environment was selected for two main reasons. First, it enabled us to create an inexpensive, but easily expandable, automated reference aid. Using Macintosh Plus computers without hard disks allowed us to place two inexpensive workstations on the floor instead of a single dedicated and expensive machine. Designing the system also introduced us to the basics of networking. Because we did everything from installing the software to running the wire, many of us are now familiar enough with the network to act as system operators.

III. THE DATA ANALYSIS

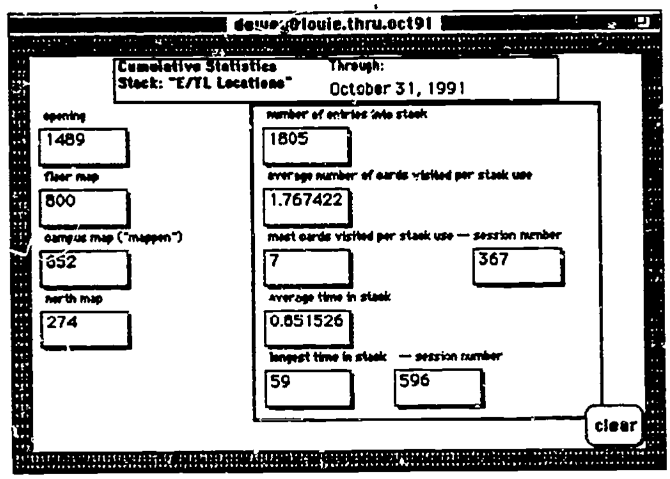
When users activate the opening screen, a file opens to capture the sequence of stacks and cards that they visit, recording the time of day and time spent in each stack. There is no attempt to identify the user, and the recording of the session transcript is completely unobtrusive. The data is analyzed automatically. The program, written in *HyperCard* 2.0, adds the current session information (cards seen, total time spent in the session) to a running total. This data is accumulated for each ARCHIMEDES station separately and cumulatively. Breakdowns by time of day (used to determine if the session occurred during a period when a reference librarian was available), month, and school term are all easily produced (Fig. 2).

We make a distinction between "in-depth" and "scanning" uses because we realize that there are large variations in the use of any library. Using a photocopier or asking for the location of a bathroom are quite different from conducting a multiple database search on Mirlyn (U-M's online catalog) or asking a librarian to find data on a topic. Early observations on the use of ARCHIMEDES showed us that there are varying levels of use for it as well.

the initial session transcripts and uses. The definitions strike a balance between differentiating between sessions where real information is provided by ARCHIMEDES and ease and speed of analyzing the data from the large number of uses.

This data analysis can run in the background on sufficiently powerful Macintoshes (SE/30 or any of the II class), freeing the machine for other uses when a large number of sessions are being analyzed. We wrote parts of this article

Fig. 2: ARCHIMEDES unobtrusively gathers statistics by noting the sequence of stacks and cards used by patrons, as well as "datestamping" their activity. It also records the time spent in each stack.



For convenience these levels were split into two categories. A scanning use is defined as a session where the user:

- did not get beyond the opening animation, or
- only saw the menu cards of three or fewer stacks. This type of use, while it presumably gives some information about ARCHIMEDES, is almost certainly not answering a "reference" question. One can make the analogy that "scanning" ARCHIMEDES is similar to briefly looking at a book's table of contents.

Any other use is considered in-depth.

These definitions are obviously arbitrary. We chose them after observing some of

while the data was being analyzed on the same Macintosh.

IV. Use Statistics

The data in Table 1 are cumulative from the first day of ARCHIMEDES operation through October 31, 1991 (seven full months plus the initial week).* The most frequently visited stacks are described in more detail below.

The *ETL Locations* stack gives locations of Libraries on the U-M main campus. It also has a floor map of ETL, which is linked to

*Much more detail is collected than is presented: Breakdowns by term/month, stack/card, and individual ARCHIMEDES station are also computed. Such detail is usually not of interest to any but the stack designers, though, and will not be presented here.

many other stacks. The most frequently visited cards in *ETL Locations* are:

- **Floor map** (800 visits) is a floor map of ETL. If this card is entered from a card in another stack (e.g., Patents from Reference Help) the area of interest is automatically highlighted.
- **Campus map** (650 visits) is a map of the U-M central campus. When a user clicks on a library name, its location on the map flashes and its hours of operation and phone number are given.
- **Missing Book** (170 visits) describes how to find a book missing from the shelf. It is a self-contained card (i.e. it is linked only to broader menu cards).
- **Conferences** (160 visits) addresses one of the most difficult tasks in the ETL — tracking down conference proceedings. It gives Mirlyn search hints and is linked to Floor map (see below).
- **Standards** (110 visits) illustrates the process of finding and viewing a standard or specification.

Number of sessions from 3/22/91 – 10/31/91: 3090

in-depth uses: 2070
scanning uses: 1020

Sessions during reference hours
(since 4/19/91): 2100
During non-reference hours: 990
Average number of cards visited per session: 9.0 cards
Average time spent at ARCHIMEDES: 2.7 min.

The most frequently visited stacks are:

ETL Locations	1810 times
Reference Help	1610 times
Special Collections	540 times
Mirlyn	470 times

Table 1. Data from the first 7+ months (3/22/91 – 10/31/91) of ARCHIMEDES use.

- **North map** (270 visits) is similar to Campus map, but for U-M's North Campus.

Reference Help is designed to answer some of the most common reference questions. It consists of cards that embody some of the knowledge of an engineering reference librarian. The most frequently visited cards in *Reference Help* are:

Special Collections describes some of the more popular, and more difficult to access, subsets of ETL's general collection. The most frequently visited cards in *Special Collections* are:

- **Patents** (150 visits) explains the resources available for patent searching in ETL. Simple instruction is also given, along with a referral to a reference librarian.

- **Technical Reports** (90 visits) gives general tips on searching for technical reports in the online catalog. Like **Patents**, it also refers the user to a reference librarian.
- **Company Information** (80 visits) provides information on where to find and how to use the company and industry directories collected by ETL. This information is useful to both researchers and job searchers.

Mirlyn is a brief tutorial on using the Mirlyn system and files. It consists of cards that mimic Mirlyn screens and include additional notes on what the various parts of the screen mean. The most frequently visited cards in *Mirlyn* are:

- **Books** (160 visits) describes the basic steps one takes to search for a book. It leads to other cards that depict Mirlyn screens and offer searching hints.
- **Periodicals** (110 visits) is similar to Books.
- **Title searching** (110 visits) describes how to search for items by title (in any of the files). Like Books, this card leads to other, more detailed cards, which show simulated title searches.
- **Keyword searching** (80 visits) is similar to Title searching.

All whole numbers are rounded to the nearest 10, and fractions to one decimal place. Changes made to ARCHIMEDES and the analysis program in the first months of operation resulted in session transcripts that the program could not tally accurately. These sessions are only a small percentage (approximately 50 out of the first 3,090, or 2%) and are not included in the statistics reported here.

V. Discussion

We will only discuss measurements of live reference that are easy to compare with the data analysis statistics — many other interesting and useful subjective measures of service are not considered. Comparing interactions between live users and librarians can give some idea of how ARCHIMEDES is being used, though. Time spent on reference and types of questions asked give a feel as to whether ARCHIMEDES is fulfilling its mission as a reference aid.

Time spent

The data on time spent by librarians on answering reference questions is sparse. Collecting such data is both time consuming and potentially very intrusive. Only a few studies have been done in academic libraries which give a rough idea of how long a reference encounter between user and librarian lasts. Whitlatch observed that 30.7% of academic reference questions were answered in less than two minutes, and 86% within five minutes.[2] Jestes and Laird found that the average academic reference interview lasted 2.0 minutes.[3]

So, time spent with ARCHIMEDES is comparable to time spent with real librarians. Extremely long sessions where users visit more than 100 cards and spend up to an hour have been recorded as well. Given the volume of questions the reference desk handles (an average of four per hour during all reference hours) we could never provide this level of attention personally. So far, ARCHIMEDES has been used 14.3 times/day. This number may not be indicative of a yearly average, since the system has been periodically unavailable (for maintenance and trouble-shooting) in the early months. Also, the statistics are predominantly from the spring and summer terms, when library use is typically low. Regardless, given the time users are spending and the types of questions they're "asking" (see below) this is a significant amount of use.

TYPE OF QUESTIONS

The time librarians spend with a user is of course not the only indication of the service provided. The amount and kind of information provided is also crucial to satisfaction. If an automated system is not designed to address the types of questions typically encountered by real reference librarians it can never provide a good supplement to their service. So we made a comparison between the types of questions we are asked at the reference desk and the types of questions asked of ARCHIMEDES.

sources and special reference knowledge to answer a question it is tallied as "research" or "research/instructional." A "referral" directs a user to another library.

Our reference desk staff record the type of question they were asked after each encounter at the desk is completed. The data are very consistent: the historical data match the data from the period in which ARCHIMEDES has operated. Table 2 presents the ETL reference desk data for the past six months.

The information we record about a ARCHIMEDES session is merely statistical and cannot differentiate between

Directional:	13% of questions asked (800)
Quick + Quick/Instructional:	74% of questions asked (4770)
Research + Research/Instructional:	13% of questions asked (810)

Table 2. Numbers of reference question at ETL, 4/91 – 10/91

Again, the literature is relatively sparse on question types in academic libraries. St. Clair and Aluri found that 44% of reference questions are directional, 18% instructional, 32% reference, and 6% extended reference.[4] Jestes and Laird found that 19% are directional.[5] We have collected this kind of data at ETL for a number of years, however. It provides us with the best basis of comparison between "live" reference and ARCHIMEDES use.

The data we collect at ETL is broken down into six categories for four types of requestors (U-M/non-U-M affiliation, in-house/telephone). Answers to "directional" questions send users to a physical location. "Quick" and "quick/instructional" questions require less than five minutes to answer and use two or fewer reference sources. When we spend more than five minutes and use two or more reference

"quick" and "research" (not without spending an unreasonable amount of programming and processing time, that is). We have chosen, then, to define only two session categories for ARCHIMEDES: "reference" or "directional." When broken down this way 66% (3450 sub-sessions) of the uses are reference, while 34% (1810) are directional. We refer to sub-sessions, defined as visits to separate topic stacks, since a user can, and often does, see many types of information in a given session.

Our data demonstrate that on a coarse scale, similar types of questions are asked of ARCHIMEDES as are asked of reference librarians. The rank order between floor map, campus map, and north campus card visits is similar to what we experience at the reference desk. This heavy use indicates that a button level analysis of the data would be useful in determining where our efforts should be directed on these cards.

Reference Help is the second most popular stack on ARCHIMEDES. This too is in accord with our experiences at the desk. Use of this st: :k may be considered equivalent to our quick or quick/instructional categories. Questions on finding a missing book, searching for conference proceedings, and performing patent searches are frequently asked. That they are also asked of ARCHIMEDES is an indication that people are consulting it for similar reasons as they consult a reference librarian. Similarly, the frequent use of the *Special Collections* stack is not surprising to our staff. Because it provides some instruction for the use of the "gray" literature so important in engineering, it is naturally of interest to our users.

The fourth most frequently visited stack, *Mirlyn*, may represent a special case. Because Mirlyn terminals are often in demand, users may approach ARCHIMEDES in hopes of using it to search the online catalog. Our observations of such users shows that they quickly realize they are not using a Mirlyn terminal. We have no way of knowing a users intention, and accidental use may account for a significant amount of *Mirlyn* stack use. But the high use of even relatively "deep" cards (those cards that require a number of mouse clicks to reach) indicates that, if nothing else, a large amount of exploration is occurring in the *Mirlyn* stack.

VI. Conclusions and Future Directions

The data we are continuing to collect and the results of the analysis of those data are encouraging. Although our expectation of significantly higher use during non-reference hours was not met, in all other respects use of the ARCHIMEDES system has been as desired. In particular:

- Users spend on average over two minutes on each session, visiting almost nine cards, and consult ARCHIMEDES approximately 14 times a day. ARCHIMEDES is being used the way we intended it. The time users spend with ARCHIMEDES is comparable to the time they spend with a reference librarian, and users are being exposed to a number of ETL services.
- There have been roughly twice as many in-depth uses as scanning uses. Users are more than just curious about ARCHIMEDES — they are learning from it.
- So far there has been no significant difference in the amount of use during reference and non-reference hours. We expect that as library users become more familiar with ARCHIMEDES, the number of uses when the reference desk is not staffed will exceed the number during reference hours.

The stacks users visit and the cards they consult within those stacks indicate that ARCHIMEDES is fielding questions typical of those we hear at the reference desk. ARCHIMEDES also aids our reference librarians, who consult it for other libraries' hours, locations, and phone numbers, for example. Because of the large number of uses of the *Mirlyn* stack, our current efforts are focused on updating this and related stacks to reflect the recent NOTIS enhancements.

ARCHIMEDES is not a static system: we are continuously updating it to include the latest information about the U-M library system as a whole and ETL in particular. Updating its contents to reflect changes in the online catalog have already been mentioned. We plan other enhancements as well:

- Converting the stacks to *HyperCard* 2.0 is expected to improve system speed.
- At the card level, an analysis of what buttons are clicked can be used to learn more about the information viewed on each card.
- At the session level, the data analysis can be expanded to determine the most frequently explored paths through the stacks. This can be used in conjunction with stack/system level information (below) to make frequently requested information easier to get to.
- At the stack/system level, correlating the "depth" of a card in a stack and the likelihood of a user visiting that card is of interest to those who worry about users getting lost in "hyper(media) space." Preliminary data appear to show that there is negative correlation–the deeper the card, the less often a visit has occurred. A detailed analysis is needed to support any new design guidelines.

When money is tight, having good ideas is only a third of the battle–implementing them and demonstrating that they work complete the picture. We have unique opportunities for design in a networked *HyperCard* environment. Better still, we have the ability to evaluate what we've done, demonstrating its usefulness and determining where new development efforts should take place.

References

1. Apple Computer, Inc., *HyperCard Stack Design Guidelines*. Reading MA: Addison-Wesley Publishing Company, 1989.

2. Whitlatch, J.B. "The Role of the Academic Reference Librarian." In: *New Directions in Information Management*, No. 22, M. Buckland (ed.), New York: Greenwood Press, 1990.

3. Jestes, E.C. and Laird, W.D., "A Time Study of General Reference Work in a University Library." *Research in Librarianship*, v.2 (Jan. 1968): 9-16.

4. St. Clair, J. and Aluri, R., "Staffing the Reference Desk: Professionals or Non-professionals?" *Journal of Academic Librarianship*, v.3 (July, 1977): 149-153.

Jim Ottaviani is a Library Associate at the Engineering Transportation Library at the University of Michigan. He received a B.S. in Nuclear Engineering from the University of Illinois, Urbana-Champaign, an M.S. in Nuclear Engineering from the University of Michigan, Ann Arbor, and is completing an M.I.L.S. at the University of Michigan, Ann Arbor.

James Alloway is Undergraduate Science Librarian and head of Reference at the Engineering Libraries at the University of Michigan. He received a B.A. in History from the University of Kansas, Lawrence, and an M.L.S. from Emporia State University, Emporia, Kansas. He is also a past member of the Residency Program at the University of Michigan.

Copies of the ARCHIMEDES stacks and related materials can be obtained from the U-M Engineering/Transportation library. Communications to the authors may be addressed to Jim Ottaviani, Engineering/Transportation Library, 312 Undergraduate Library, University of Michigan, Ann Arbor, MI 48109-1185; 313/764-7494. Internet: et_ref@ub.cc.umich.edu

Macintosh computers are now an integral part of research at the Ohio State University. Students are flocking to nine Macintosh IIsi computers in the University Libraries to use the new electronic tool called *The Gateway to Information.* This innovative computer project guides expert researchers as well as library and computer novices to relevant library resources in both print and electronic formats, all from a single workstation.

The Gateway to Information:

Using Macintosh, *HyperCard*, and *MitemView* to Simplify Information-Seeking at The Ohio State University

Fred Roecker

The Need for Computerized Guidance

Five years ago, Virginia Tiefel, Director of the Ohio State University's Office of Library User Education, recognized the urgent need by Ohio State students and other patrons of the University Libraries to acquire effective information-seeking skills. Library patrons were simply paralyzed by the amount of information contained in Ohio State's 26 libraries. Unfortunately, budget restrictions and limited personnel made it impossible for the Libraries to provide more workshops, more staff supervision at CD-ROM terminals or longer reference hours. At that time, a half a decade ago, over 20,000 Ohio State students a year were given some form of bibliographic instruction. But Virginia Tiefel recognized that these one-hour sessions were not adequate in developing skills in students to locate relevant information.

A Buck Rogers Solution

In 1986, Tiefel realized that a bold move, using futuristic technology, might address these growing demands. Computers could provide instruction at the exact point of need in a library, simplify access to electronic databases, and even encourage critical thinking. But the use of computers posed a new problem. While some students were familiar with computers, many more were not even modestly computer literate. A workstation designed for bibliographic instruction would have to be childishly simple, not to intimidate patrons on their first try. Yet it would also need to be sophisticated to address a variety of research needs of a diverse academic community.

Goals

Tiefel felt that the ideal system for bibliographic instruction, designed with undergraduates and library novices in mind, must

- display an outline of a search strategy to guide novices through their first steps in research;
- direct patrons to appropriate materials, and provide clues to evaluate these tools for their own needs;
- provide a simple interface to the Library's online catalog, as well as other electronic databases; and
- require no immediate assistance in the form of manuals, staff or workshops.

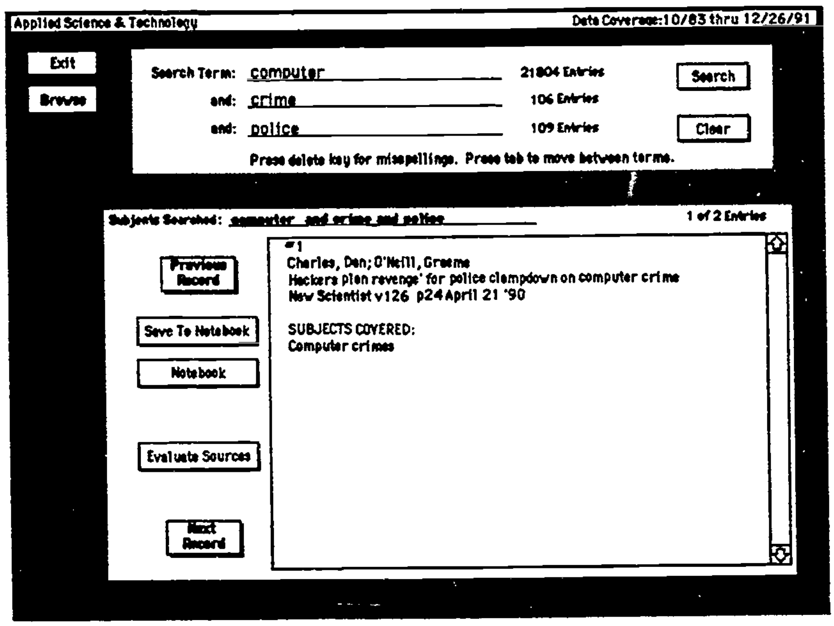
Susan Logan, Coordinator of Automated Library Systems, outlined how technology could be adapted for this project, incorporating networked CD-ROMs into the system. The Director of the University Libraries, William Studer, provided tremendous encouragement and staff time for the project. Funds were provided by grants from the U.S. Department of Education (FIPSE and Title IID) and The William Randolph Hearst Foundation for equipment and a programmer. These funds allowed the Libraries to hire Senior Programmer/Analyst John Salter, and to purchase eight Macintosh IIcx computers and ImageWriters. Apple was also very supportive with suggestions and a donation of two Macintosh IIcx computers for programming. The project was named *The Gateway to Information.*

Interfaces

The purpose of *The Gateway* was user independence; at any time or at any location, a patron could find assistance to specific research problems on demand. *The Gateway* needed a simple, easy-to-use interface. Yet this interface required great flexibility to move with the needs of the patron. *HyperCard* was the answer. It was easy to program and modify. For patrons, they could pursue information directly to specific sources, or browse at their leisure through a range of search strategies.

However, preliminary tests with undergraduate students at Ohio State proved that they had a low level of understanding of *HyperCard* icons. In the earliest *Gateway* prototype, *HyperCard* arrows and icons were used on screens for page turning, returning to menus, and other actions. The concept of clicking on a button with a word direction — "See List" or "Print" — was clear to students, what screen a patron would go to when activated. The instructional screen was discarded. A *Gateway* design rule was created — additional information screens will not be required by patrons to understand any function. When scrolling boxes were incorporated into the narrative — boxes once considered by designers as too difficult for novices — the only help given to patrons appeared below the scroll arrow, as "Click on arrow for more." The simple instruction assisted patrons

Fig. 1: The Search Strategy Map is the opening menu to *The Gateway.*



but icons stopped them cold. Under observation, these test students were noted to helplessly scan the screen for some text-based box to click, completely overlooking arrows and icon buttons. Even an introductory screen of instructions, explaining buttons and their functions, was skimmed or ignored during tests. Those students familiar with the Macintosh were insulted by the condescending help screen, containing "obvious" information, delaying their searching.

Based on these studies, most icons as buttons were eliminated, replaced with "word buttons" that spelled out exactly immediately at their point of need, and they quickly mastered the new skill.

Search Strategies

The primary function of *The Gateway* was to help undergraduate and novice library users locate information by using an organized search strategy. This philosophy — moving from broad, general resources to specific data — had been taught in traditional bibliographic instruction classes and workshops for 14 years at Ohio State. A search strategy diagram reflecting this concept eventually became the first menu screen (Fig. 1).

Reference librarians in the Undergraduate and Main Libraries provided information on topics most often researched by patrons, based on their experiences in serving *The Gateway's* potential audience. As a consequence, patrons using *The Gateway* originally were guided to over 90 encyclopedias, 70 periodical indices and 90 biographical, statistical or review sources. Each source was featured on a card in *The Gateway*, with call number, location and abstract to assist patrons in making decisions over the utility of each item. The number of sources continues to increase in *The Gateway*.

CONNECTIVITY

Providing access to electronic databases, such as Ohio State's online catalog (LCS) or DOS-based CD-ROMs, proved to be more difficult. The first working prototype of *The Gateway* consisted of two computers — a Macintosh IIcx to test the *HyperCard* component, with a DOS terminal next to the Mac to provide LCS and CD-ROM access. When *MacTCP* was incorporated into *The Gateway* in 1989, searching became possible from one computing platform.

Virginia Tiefel imagined that these now accessible resources should require only modest effort on the part of patrons, with difficult commands buried behind the scenes. Ideally, a user need only type in their subject or a keyword; the program would do the rest of the work. Pursuing this concept, Li Fen, a graduate student, programmed a *HyperCard* interface to the Grolier *Electronic Encyclopedia* with over 200 hours of work. With this front end, test users attacked Grolier's from a friendly screen display, without moving to another workstation, moving disks, or understanding specific CD-ROM search commands (Fig. 2).

This sort of effort was too time-consuming to make a large number of CD-ROM products available via *The Gateway*. Fortuitously, *MitemView* became available, achieving quite a notoriety in the library community with *MacNOTIS*, the *HyperCard/MitemView* interface for the NOTIS online catalog at Texas A&M University. John Salter contacted the MITEM Corporation, and the Ohio State Libraries became a beta site to further test *MitemView* as a part of *The Gateway*.

With *MitemView*, a student programmer could "grab" a field from a DOS CD-ROM and place it in a template. Buttons for "Print," "Search" and "Select" were programmed to replace confusing DOS function key commands. Onscreen display commands were unnecessary and removed, further simplifying the interface in *The Gateway*. With the template in hand, it could easily be adapted in a few hours to other databases from the same vendor. With additional programming, the same template could work for all electronic indices — Wilson, SilverPlatter, & UMI — as well as LCS. Patrons were never lost among screens and search commands. Accessing and searching on electronic databases required no more skill than clicking on a button or typing in a subject!

PROTOTYPE TESTING AND EVALUATION

In January 1990, two prototype Macintosh IIcx computers were placed in the Main Library for public testing a few hours a day. A *Gateway* developer coerced patrons to operate the system, observing their searches and problems, noting their comments, and asking them to fill out an evaluation form. Two additional computers were added to the Main Library in June, 1990 and left unattended to test reliability and to see if the students could work with the program unassisted. Four computers were placed in the Undergraduate Library in January, 1991 and, later in the year, an additional computer was added to the Main Library. The University recently purchased 50 Macintosh IIsi computers to replace the worn LCS Telex terminals and provide greater access to *The Gateway*.

A notebook function was added to *The Gateway* to allow users to save the results of their searches for printing. This electronic notebook can store about 25 pages of citations in a scrollable box for eventual printing. It saves paper and forces the patrons to mark specific citations rather than blindly downloading every citation in a search.

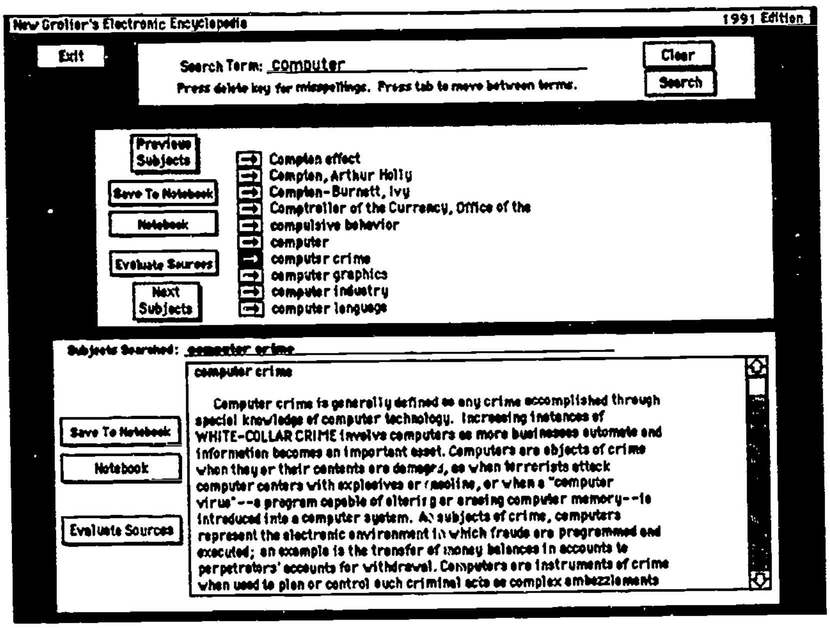


Fig. 2: *Grolier's Electronic Encyclopedia* is accessible with a unique *HyperCard* interface in *The Gateway*.

GATEWAY'S FUTURE

It is the intent of the University Libraries to make *The Gateway* available remotely to users. Students should be able to access it from dorms or computer labs, faculty from their offices. In addition, the English Department is interested in loading *The Gateway* on Macintoshes in their Writing Labs. Students could prepare a research paper on a *Gateway* terminal, check electronic sources, read full text articles, cite references and print the results, all from one Writing Lab workstation.

The Gateway could easily be adapted to other libraries. Although conceived and developed in an academic environment, it is equally relevant to situations in school and public libraries. Currently, negotiations are underway with a major company to license the product and distribute to libraries nationwide.

CONCLUSIONS

By creating *The Gateway to Information*, the Offices of Library User Education and Library Automation have developed a computer program that delivers quality and consistent information-seeking skills to a broad, general student population. A *Gateway* Macintosh serves as a simple tool for accessing a variety of materials in the Libraries of the University. Finally, *The Gateway* encourages critical thinking on the part of patrons to evaluate materials for their specific needs.

The Gateway has grown over the past four years, and has been accepted by both novice and expert users as a vital library tool. It delivers on its promise daily as a "one-stop-shopping" computer for basic research, bringing together a variety of electronic and paper resources under a single umbrella. *The Gateway* has demonstrated that it is possible to change the way students approach research, to make them more independent. Barriers to information have been lowered and libraries in a sense are less mysterious. *The Gateway* is opening doors to resources, leading even novice users to new and exciting research paths.

Fred Roecker was a tennis professional, school teacher and entrepreneurial consultant before joining the Libraries of Ohio State University. Currently, in addition to his tasks as User Education Librarian, he is in charge of evaluation and design coordination of *The Gateway to Information* Project. Mail will reach Fred at 326 Main Library, The Ohio State University, Columbus, OH 43210-1286. His phone number at the University is 614/292-6151. Electronic mail can be directed to him at ROECKER@OHSTMVSA.

School Libraries and Smart School Development

Charles Stallard

In 1990, the Hampton (VA) City Schools embarked on an ambitious plan to develop a model, technology-intensive high school. The purpose of this "Smart School" was to allow the District to have first-hand experience with emerging technologies. We wanted to explore their potential, and their problems first hand to inform our restructuring efforts. Our philosophy was based on the premise that we live an Information Age.

Information technologies should be an integral part of an education, rather than a peripheral support to traditional educational routines. This shift away from the "audio-visual" attitude represents a major move in our use of technology. In our Smart School, the information infrastructure is as basic as lighting and water.

Very early in our planning process, we decided to shift away from computer-aided instruction (CAI) or the routines of drill and practice. Instead, we wanted technology to be used in school as it is used in business and industry. As a consequence, our plan focused on the creation of an information infrastructure. The Library became the nerve center of the School. Placing the heart of the Smart School in the Library redefined the roles of library staff, the operation of the Library and even the basic definition of the school library.

Introducing the Smart School

What exactly is a Smart School? Our concept changes as we gather experience and receive feedback from visitors. Initially, we identified two criteria for a Smart School. Networking became our first requirement. We chose the Macintosh as our computing platform for the Smart School , by virtue of its built-in networking capabilities.

Secondly, the School needed to connect to the rest of the world. We accomplished this by creating an Electronic Classroom, supported by a steerable satellite dish, speaker phone, fax and network modems. Distance learning, teleconferencing, electronic mail and access to remote databases were all features in the Smart School. Our goal was to give users quick and easy access to remote data and electronic mail from their desks. Networking and connectivity were quite complementary in the Smart School.

Two years have passed, and two criteria have been added to the Smart School. First on this new list is adaptability. Instead of the procrustean notion that the child must fit the curriculum and the school, we want to use technology to adapt the school to the student. To accomplish this idea, we are examining ways to make demographic and achievement information about students more readily available to teachers and administrators. To this end, we are in the process of installing Apple's Data Access Language (DAL) on our IBM 9370 mainframe. High-speed modems and gateways will allow users to simply point and click the mainframe from their desks, retrieving data as required.

Finally, a Smart School should be more productive than its traditional counterpart. Simply, productivity means more learning at less cost.

The Library in the Smart School

How did the Library become the nerve center of the Smart School? In our division, secondary libraries are staffed with two professional librarians and two technical assistants. As we started to examine networking, and tried to identify local expertise, we naturally gravitated to Library staff. Librarians were most familiar with new technologies and most willing to undertake the challenge. After all, librarians are professional information managers. Also, they were the only staff members who were not required to give classes of students their full attention during the school day.

During Phase II of the project, three Mac SE/30s were installed as file servers in the school Library office. LocalTalk and AppleTalk were replaced with a faster network, using Ethernet on 10baseT. This increased our potential data transfer speed to 10 Mb/sec instead of AppleTalk's 230 Kb/sec. We retained the use of

AppleShare, however. We added larger storage devices and network modems as well as CD-ROM drives to the servers. We made the assumption that more information would be available in some electronic form, digital information that could be accessible from any workstation on the network via the file servers. We discovered that there is a shortage of meaningful Macintosh CD-ROMs; too much tends to be trivial or cannot be accessed remotely. As a consequence, we are buying fewer CD-ROM drives and more large capacity hard drives. With these drives, we are building our own collection of scanned images and historical and science-related data. We are preparing to start a collection of compressed video images and segments using *QuickTime*. For these locally developed files, we use *HyperCard*, Microsoft *Excel* and *Works*, and Claris *FileMaker Pro*.

For library automation, we chose a program from COMpanion called *Alexandria*. This multiuser product allows us to deliver the Library catalog to anyone on the network. We assume that as more information becomes available in some sort of digital format, the Library will disappear into the network topology. We also assume that this digital information will be more useful in that it can be manipulated in more ways than currently possible. Students and teachers will be able to log into the network, from home-bound equipment or hardware borrowed from the Library.

At our current level of demand even the two professional librarians cannot keep up with the demand for support and network maintenance. We have assigned one teacher to help and will probably have to reassign other staff as their skills develop, and as we learn how to better use our information infrastructure.

If you visited our Library, you would find, in its public areas, *Newsbank* on CD-ROM, the Grolier *Electronic Encyclopedia*, Macintosh Classics devoted to networked CD-ROMs such as the *USA Factbook* or *World Factbook* and Macintosh Classics dedicated to the *Alexandria* online catalog. In the Library office, we have installed a teacher resource lab with scanners and laser printers. Placing this lab in the office means that the librarian can provide immediate support and assistance to users.

Two Macintosh writing labs, a Mac math lab and a Mac lab for general use complement the network of classroom and administrative computers. We envision adding additional servers in coming months to ease the downloading of administrative and student data from the District's mainframe on a daily basis. Each new database added to the network increases the managerial load for the Library staff. Managing access privileges to files, folders and volumes and keeping a tight schedule of data backup significantly increases their workload. Fortunately, some of the former inventory duties associated with the Library are expedited with *Alexandria's* report generation feature.

Lessons

Experiences from our pilot program at Bethel High School are now being used as a basis for our development of Smart Schools at three other high schools, five middle schools, and two elementary schools. Our five-year plan ambitiously assumes that all 33 schools in the District will be converted by 1996.

Training continues to be a major task. Librarians have become key trainers in the fundamentals of working in a Smart School. The Library staff have also become responsible for database design and the development of other electronic resources. One librarian is collaborating with social studies teachers on using *HyperCard*, *Point-of-View* and *QuickTime* to develop networkable resources for teaching local history. These sorts of projects mean that librarians in the District will be increasingly responsible for large collections of *HyperCard*, digital sound and *QuickTime*. Managing the total network — both new users and new resources — and fee-based services such as DIALOG add significant roles for librarians in the District.

Future

During the coming year, we will be expanding the local area network into a wide-area network, by connecting Smart Schools together via modem. Interlibrary circulation of both print and digital resources will be enhanced as students and teachers will have access to online catalogs of other schools. By sharing resources, school libraries will be able to specialize in particular areas. For example, one high school features a program on robotics; its Library could focus on that particular topic in its collection. Nevertheless, most use of library resources will remain local, but there is the potential to reduce duplication and build a stronger and more broadly based collection. For the first time, we are thinking in terms of collections development across the entire District rather in each individual school. *Alexandria* will provide a more exact profile of the use of collections across the District, enhancing our decisions over acquisitions. Additionally, the technologies in our Smart Schools are providing us with the freedom to rethink the traditional school cycle. We are considering a seven-period school day and flexible staff hours as part of this process.

Charles Stallard is Director of Library, Media and Technology for Hampton (VA) City School. Previously, he was Associate Professor of Computer Education for 10 years at Old Dominion University in Norfolk (VA). He has authored several books on computer education and has published in a number of journals. He recently founded the Center for Smart School Development, an organization dedicated to help schools and districts design and implement Smart School technologies. He can be reached at the Center for Smart School Development, 605 Botetourt Gardens, Norfolk, VA 23507. AppleLink: K2296.

HyperCard VIRGO Training

Christie Stephenson

In the summer of 1991, a small group of department heads from the University of Virginia Library convened to identify the basic needs for a library-wide staff training program for the Library's NOTIS-based online catalog, VIRGO. At the same time, as a self-taught *HyperCard* user, I was seeking an opportunity to improve my skills, especially in HyperTalk programming.

The University's Curry School of Education has a nationally- recognized program in Instructional Technology. After discussing my personal goals with Glen Bull, a professor in the IT program, I decided to enroll in Computer Courseware Tools, a graduate level course in which students develop *HyperCard* programs for "real-world" clients. Mr. Bull agreed to let me develop an instructional program for the Library as my class project. I discussed the possibilities with the Library administration, and they decided that the Library's identified need for introductory VIRGO training could be met by developing a *HyperCard*-based program.

Process — Defining the Project

As both a student and a library employee, I acted as the principal liaison between our "clients" (the Training Committee of the Library) and the stack developers — me and my partner, Chris Lehmbeck, a graduate student in Instructional Technology. From the outset, it was clear that we had to put strict limits on the scope of the work — to define a project that would both meet the initial needs defined by the Training Committee and be limited so that we could accomplish the stack development in two and a half months (the length of the course).

In early meetings with the Committee, we relied heavily on the stack building process outlined in *HyperCard Stack Design Guidelines* to refine the goals of the project.[1] As a group we outlined the Library's expectations, defined the user group for the training program, and discussed in detail the content of the program. We then ranked the list of topics to be covered and settled on three major components to be included in the initial project:

- VIRGO hardware and its configuration.
- Logging on and off VIRGO.
- Searching the online catalog in the "public" mode.

We also agreed to design the program in a modular fashion so that additional topics could be developed in the future and incorporated in the basic stack design.

The primary audience for the training program would be new library employees. Our goal was to relieve the Assistant Systems Librarian of considerable repetitive training responsibility and to ensure that new staff would develop uniform mastery of a defined set of basic competencies. With these understandings, we set about the task of stack development.

As development continued, Chris and I met regularly with the Training Committee to get their feedback on the stack design. In the course of those meetings, we decided to add an introductory module, "What is VIRGO?," to provide the overall background for the more specific modules already planned.

The Program

After a brief introduction to the goals of the program and the basic stack navigation techniques, the main menu card is introduced. A user can access any of the four training modules from buttons on the main menu and, after completing a module, return to the main menu to select another module, or exit the program (Fig. 1).

Each of the modules has a distinctive background, employing graphic elements to underscore the computer theme. All backgrounds share the same basic navigation bar running across the bottom of the card, which includes forward and back arrow buttons, a help button and the menu button (Fig. 2).

We included a hypertext function to provide additional information about

87

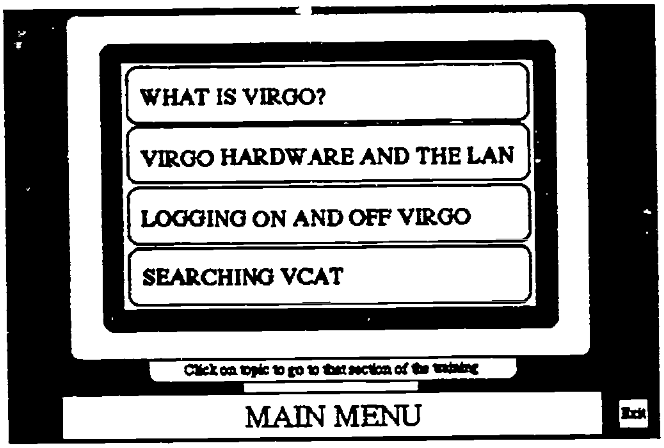


Fig. 1: *HyperCard* VIRGO Training – Main Menu

technical terms used in the program. Throughout the stack, certain words are italicized and in bold face type. These words are covered by transparent buttons which take the user to glossary entries for those words. The glossary cards include a return button which takes the user back to the card they just came from. This feature is controlled by a simple push card/pop card pair of scripts.

Each module ends with a brief set of review questions. If the user answers a question wrong, a buzzer sounds and they're asked to try again. If they answer correctly, they receive applause and are asked to proceed. At the conclusion of the questions, they are prompted to return to the main menu to select another module or exit the program.

The Modules

What Is VIRGO?

The first module, *What Is VIRGO?*, introduces the user to the online catalog — VCAT (the OPAC) and the three other databases currently available — WILS (Wilson indexes), CART (*Current Contents:* Articles) and CCON (*Current Contents:* Journals). This module is brief and simple to navigate, to accustom the user to *HyperCard*. It briefly describes the contents and basic search techniques for each database.

VIRGO Hardware and the LAN

In this module the user is introduced to the VIRGO hardware and communications environment. It explains the types of devices used to connect to VIRGO (dumb terminals and microcomputers) and the basic links in the communications network from the terminal through the LAN to the mainframe. A variety of graphics and simple animation techniques are used to simplify and enliven the complex information presented.

Logging On and Off VIRGO

This module presents instructions on how to log on and off the system from both microcomputers and dumb terminals. We replicated the actual process using the autotype command. Each screen that a user encounters in logging on and off is shown in sequence; the required commands and the system's response are

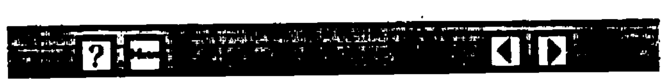
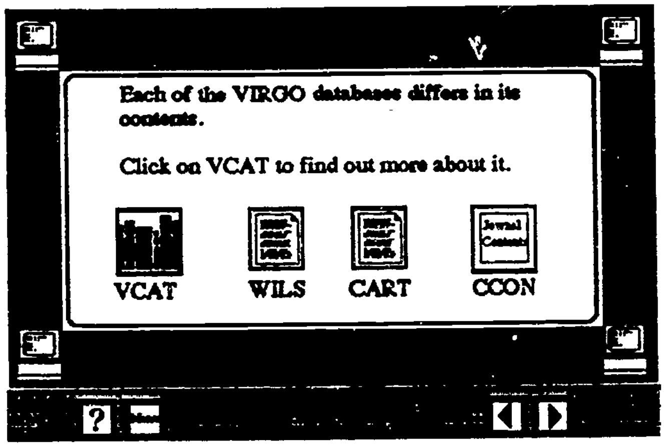


Fig. 2: The navigation bar is a consistent element throughout the stack.

Fig. 3: *What is VIRGO?* – Sample screen showing graphic representations of the four databases.



typed onto the cards by the controlling scripts.

Searching VCAT

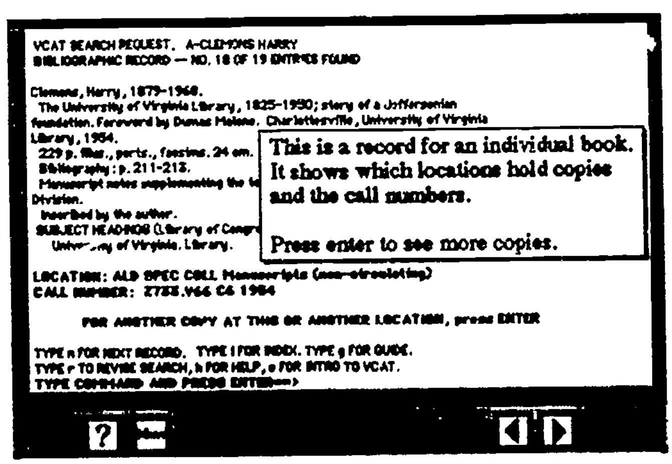
The program's final module demonstrates the fundamental conventions for searching the online catalog — author, title, subject and keyword. It also introduces the basic principles of Boolean searching. The user is instructed to type specific commands and then is shown the actual screen retrieved by the search. Pop up fields appear after a few seconds to explain specific features of the retrieval. This section of the training program is quite powerful and could easily be adapted for use in bibliographic instruction in addition to staff training (Fig. 4).

DOCUMENTATION

One of the benefits of developing this program for the Computer Courseware Tools class was the production of documentation for the stack as part of the course requirements. Documentation is frequently either not produced at all or written only as an afterthought. We were required to produce both a user's manual and technical documentation, submitting drafts throughout the semester as the project developed.

The final documentation included a Users Guide consisting of instructions for getting started, a navigation guide, and a reference guide to the primary buttons. The technical documentation was a *tour de force*, over 125 pages long. We printed the stack, four cards to a page in a single column. Next to each card were the scripts for the card and any card-specific buttons, which we extracted from the stack using a utility

Fig. 4: *Searching VCAT* – Sample screen illustrating the use of pop up fields to explain specific points about the search results.



program called *Script Report* v. 1.2 (by Eric Alderman). We simply (tediously!) formatted the scripts to print in the appropriate position. We also included a list of all objects on each card. Although the production of documentation was admittedly burdensome, its existence has already proved invaluable as a central place to note changes to the text and scripts which have been made since we began using the stack for actual training.

PROJECT EVALUATION

Although producing a program of the scope of our *HyperCard* VIRGO Training Program in a single semester was an ambitious undertaking, working within the structure of the course provided several benefits. In addition to producing the required documentation, we had to place our stack in a folder on the file server for weekly review by the class. This requirement meant that we had to continue to show progress throughout the semester — no last minute development! We received valuable feedback from clients and class as we progressed. In addition, we had a class electronic conference where we could post scripting questions and get help from both the professor and our classmates anytime we were stuck. Unfortunately, because of the time constraints presented by the course structure, we were not able to test the program widely during its initial development. That process is currently underway and will undoubtedly result in changes to the content of the stack.

In addition to meeting the need for a basic VIRGO staff training program, the project had several additional benefits. A number of library administrators have now been exposed to the power and versatility of *HyperCard* as a training tool. In addition, we have developed a relationship with the School of Education which should make it possible to draw on graduate students in the Instructional Technology program as stack developers for future projects.

Notes

1. Apple Computer, Inc., *HyperCard Stack Design Guidelines*. Reading MA: Addison-Wesley Publishing Company, 1989.

Christie Stephenson is the Assistant Fine Arts Librarian at the University of Virginia Library. In addition to her other responsibilities, she is the chief proselytizer for Macintosh in a PC-dominated library. Her current ambition is to produce, direct and star in a QuickTime movie in the coming year. She can be contacted at the Fiske Kimball Fine Arts Library, Bayly Drive, University of Virginia, Charlottesville, Virginia 22903 or by phone at 804/924-6607. She can also be reached electronically at CDS2E@VIRGINIA.BITNET (Bitnet) or cds2e@poe.acc.virginia.edu (Internet).

The CORE Project:

Formatting Chemistry Information for Screen Display in *HyperCard*

Stuart Weibel, Mark Bendig & Will Ray

INTRODUCTION

CORE (Chemistry Online Retrieval Experiment) is an electronic library project intended to address problems of database structure and user interface design in an academic, distributed computing environment. The goal is to deliver primary information resources to the scholar's desktop using electronic republishing techniques. The CORE Project is a collaborative effort among five institutions — Cornell is the host institution; Bellcore provides hardware and processing expertise for data conversion as well as user interface development; OCLC is building a user interface as well as designing and building the database; and the American Chemical Society (ACS) and Chemical Abstract Service (CAS) are providing some 200+ journal-years of data and associated indexing (all ACS journals since 1980).

OCLC's role in the CORE Project is to implement a database structure and build a database that will support the functionality of experimental interfaces from both Bellcore and OCLC's own interface design team. The database design process, a collaborative effort among all CORE participants, is embodied in Standard Generalized Markup Language (SGML) which is subsequently used to drive the database-building process.

OCLC's SCEPTER user interface is an Apple Macintosh-based interface that incorporates ideas and lessons learned from previous phases of the CORE Project as well as design activities associated with OCLC's Primary Journals Online development effort. The interface will be used to explore design issues concerning the functionality necessary to support collection and document browsing, search and retrieval methods and desirable displays in scientific databases dealing with subject areas such as chemistry.

Special Problems in CORE

The challenges of bringing the world's information into electronically accessible form divides into three parts — capturing information from existing paper or microfilm images; publishing information in electronic form from the start; and converting machine-readable typography files to electronically accessible files. The CORE Project falls into the final category.

The database — some 200+ years of ACS journals and CAS indexing — is among the most difficult of textual databases to represent accurately, filled with special characters, formulae and complex tables. If the problems of delivering this kind of information can be solved, then almost any document collection can be processed.

SGML and Descriptive Markup

Electronic typesetting languages have evolved to serve the page description requirements of paper printing. These languages consist of codes describing the layout and typefaces of a document. Although they satisfy the basic criterion of being machine-readable, they are not tailored for content access and display. Conversion of these files to more useful formats comprises a major portion of the effort invested in the CORE Project. The farsightedness of the American Chemical Society in keeping backfiles of their typography files to 1980 makes it possible to convert these 20 journals to electronic format, in effect republishing them in a new way.

The target format for this process is SGML, where data is simply enclosed between a start tag and an end tag that delimit the string and describe the functional role of the item in the document. For example, in SGML the title of this article would look like

```
<title>The CORE Project: Formatting
Chemistry Information for Screen
Display in HyperCard</title>
```

This descriptive tagging has two major benefits. First, a database can be built that takes advantage of the inherent structure of documents as well as their content. This enhancement will improve retrieval precision, especially as databases grow in size.

The second benefit of this sort of markup is treated at length in this paper, namely the use of markup as a mechanism to specify display characteristics. SGML can be used to specify an arbitrarily large character set as well as typographic attributes. Explicitly, a tag set indicates, for example, bold-face type:

```
<b>BOLD</b>
```

It can also be done implicitly by imbedding formatting rules in a display processor. For example, a formatter may know that titles are to be centered and set in a typeface two points larger than body text, and separated by one inch of white space from the next element. The advantage of this approach is that the display is completely independent of display technology.

In CORE, this method is particularly advantageous, given that a single database must support at least three distinct graphical user interfaces with different design philosophies and operational requirements, all on Ethernet with a variety of workstations. The cost for this flexibility is the need to write and maintain a formatter that translates the markup to a particular display style for each output device.

Prototyping in HyperCard

OCLC's interface is known as SCEPTER (SCientific Electronic Publishing and TExt Retrieval). The model adopted for development of SCEPTER is to prototype the system in *HyperCard* 2.0v2 and use that version of the program as a "living specification" to drive other interface development efforts.

Since CORE is being implemented in a heterogeneous software and hardware environment, one of our goals has been to achieve a high degree of portability across platforms. The X-Windows system is the best single solution to this particular problem. Though it has its own problems and drawbacks, it has achieved considerable currency in academic circles. At the same time, we are reluctant to abandon the flexibility and rapid prototyping available with a medium like *HyperCard*. This flexibility means that a number of alternatives can be explored in a short time. In one case, our *HyperCard* developer actually modified the program to reflect a user's suggestions during the course of a formal presentation.

The Formatting Problem

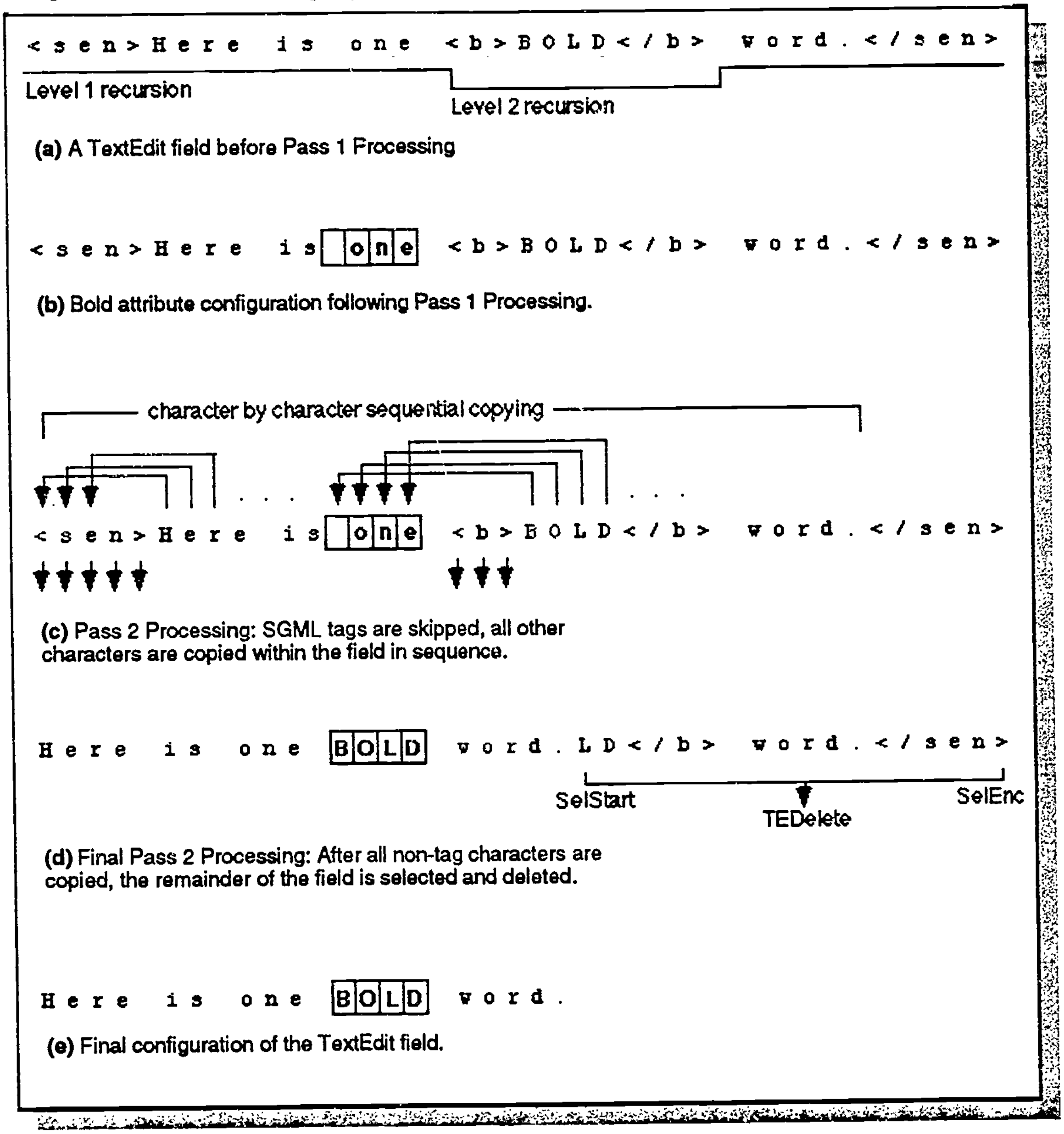
Few examples of text formatting are more difficult than chemistry data. The text is characterized by a plethora of special symbols and display nuance that are often critical to the interpretation of the data. The requirement of "on-the-fly" processing adds another twist to the problem, requiring a solution that is both elegant in its results and efficient in its application.

The formatter must:

- Recognize explicit display attribute tags (bold face or other typeface changes, for example), change text attributes appropriately and delete the tags.
- Recognize tags that are purely functional descriptors and which have on consequences for display. These tags can simply be removed.
- Recognize tags that have implicit formatting side effects, affect these changes and remove the tags from the text stream.

Marked-up text retrieved from the database is imported into a *HyperCard* field. Being a Macintosh TextEdit record, it provides all of the normal TextEdit facilities of the Macintosh Toolbox for modifying the appearance of the text (**Table 1**).

Fig. 1: SGML Formatter Processing Sequence.



The most straightforward approach would be to step through the text looking for SGML tags and use those tags to trigger the appropriate text attribute change. Subsequently the tags themselves would be deleted.

There are two problems with this approach. First, SGML is hierarchical; tags are often nested. A linear strategy requires a separate pass through the text for every tag set. The processing time is linearly proportional to the length of the tag list.

One solution would be to make the processing recursive with an algorithm stepping through the text looking for SGML tags. When it encounters a start tag, it drops down one level of recursion and begins looking for another tag from that point in the data. When it finds an end tag, it pops up one level of recursion. Whenever a recursion returns, it presumes that the end tag just found matches the start tag for which the recursion was called, and the appropriate style change is executed for the marked text.

A second problem affects performance. Every TEDelete call results in a memory move of all data in the TextEdit record beyond the moved tag. It also causes a pass through the TextEdit style runs, checking for runs which must be moved, removed or concatenated. The accumulated delays for richly marked data slow down the reformatting to an unacceptable speed.

Tags can be removed using standard TextEdit commands. However, if deletions are done for each individual tag, a large number of memory block moves are required. Each deletion requires that all data downstream from the deletion point must be moved. This inefficiency can be averted by copying data within the TextEdit field, character by character, without recourse to the TextEdit commands. Each character is inspected. If it is part of an SGML tag, then the tag is skipped (not deleted). All non-tag characters are simply copied sequentially to the appropriate place in the TextEdit field. SGML tags, rather than being deleted, are simply replaced (copied over).

The alignment of characters and their attributes are handled automatically if TextEdit commands are used in a TextEdit field. Because we do not use these commands by virtue of their inefficiency, we must maintain the alignment ourselves. To accomplish this, the formatter keeps track of the length of the SGML tags that will ultimately be removed. Attributes in the text field are set such that their position will correspond to the final location of the displayed characters, not the location of the characters in the tagged data.

Examine the accompanying figures to better understand formatting. In Figure 1a, a sample text field is illustrated. The bold attribute is shown in Figure 1b, set during the first pass. Note that the attribute is misaligned with the intended text at this point. Only after tag removal will the attribute and the characters be aligned properly. After the first processing pass, the style attributes for the characters

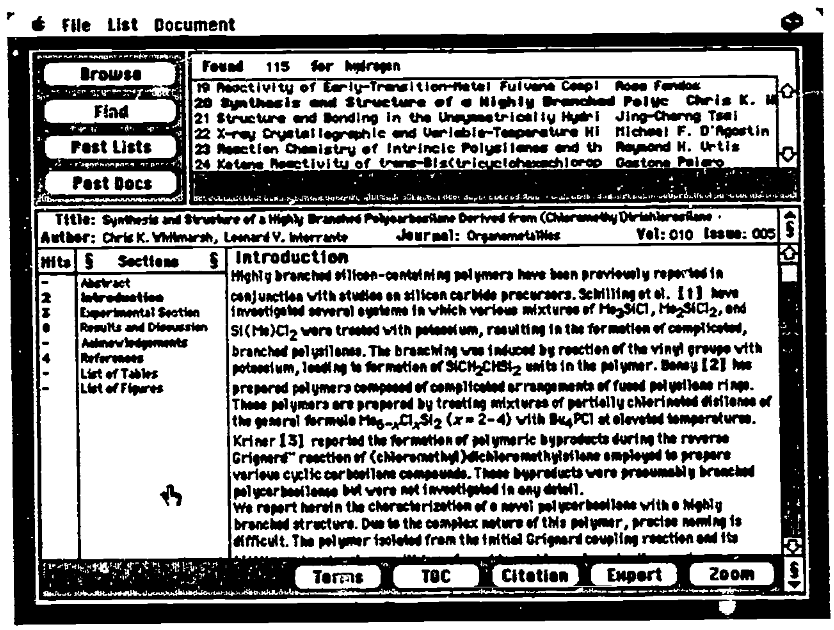


Fig. 2: A screen bitmap illustrates a typical result of the formatting process.

Table 1: A Summary of TextEdit Calls, commonly used to modify text fields. For further details, see Apple Computer, Inc. *Inside Macintosh.* Reading, MA: Addison-Wesley, 1985-90.

`SelStart and SelEnd`	Two fields of the TextEdit Record, denoting the beginning and end of the selected region. A TextEdit may have only one selected region at a time, upon which all editing functions take place (Cut, Copy, Paste, style changes, etc.)
`TEDelete(hTE: TEHandle)`	Delete the currently selected region (denoted by the region between SelStart and SelEnd) of the TextEdit belonging to the TEHandle hTE.
`TESetStyle(mode: integer; newstyle: TextStyle; redraw: BOOLEAN; hTE; TEHandle)`	Set the style of the currrently selected region of the TextEdit belonging to hTE to TextStyle newstyle. The mode variableindicates which elements of the style to change (font, size, typeface (bold, underlined, etc.), color), and whether the changes are additive, or replace the original style. The redraw variable simply tells TextEdit whether it should update the displayed text on the screen after this call.

are in their final field location — they are "waiting" for the appropriate characters to be copied into position. The process of sequential copying of characters from one part of the field to another is shown in Figure 1c. Only source text characters are copied; any character that is part of a SGML tag is skipped. When the last source text character has been copied forward into the text field, the remaining characters are selected and deleted with conventional TextEdit commands (Fig. 1d). The length of this string is equal to the sum of all of the tags skipped in the copying process. In Figure 1e, the configuration of the field at the conclusion of all of the processing is shown.

The complexity of "on-the-fly" display of richly structured text is a problem that will increase in importance as more full-text databases become available. This algorithm provides a model for display of SGML markup that preserves the flexibility of *HyperCard* while surmounting the inefficiencies that compromise performance in an interpreted environment. A screen bitmap in Figure 2 illustrates a typical result of the formatting process.

Conclusions

The CORE Project is a model for bringing existing publications from the traditional world of paper publishing into the realm of electronic publishing, retrieval and delivery. This effort involves two large and interwoven tasks — translation of existing typography files to a database format suitable for end user applications, and the development of user interfaces that provide functionality, enhancing access to these documents. Display formatting of complex data is one of the challenges that must be addressed in this process. The techniques described here represent one approach to solving these problems in the *HyperCard* environment on the Macintosh.

Acknowledgements

We are grateful to Apple Computer, Digital Equipment Corporation, Sony Corporation of America, Springer-Verlag, Sun Microsystems, Inc. and Thinking Machines Corporation for their contributions and support of the CORE Project.

Mark Bendig (left) is Senior Systems Analyst and SCEPTER Lead Designer in the CORE Project. He can be contacted at Internet at mwb@rsch.oclc.org.

Will Ray (center) is Research Assistant in the Macintosh Implementation Team, which is part of OCLC's CORE Project. His Internet address is wcr@rsch.oclc.org.

Stuart Weibel (right) is Senior Research Scientist and CORE Project Manager in OCLC's Office of Research. Communications will reach him at OCLC, Inc. 6565 Frantz Road, Dublin, OH 43017. Phone: 614/764 6081. Internet: stu@rsch.oclc.org

Vendor Index

The following is a listing of the vendors of hardware and software products mentioned in these pages:

Abaton Technology
48431 Milmont Drive
Fremont, CA 94538
415/683-2226
Scanner

Abbott Systems
62 Mountain Road
Pleasantville, NY 10570
800552-9157
914/747-4201
CanOpener

Activision
3885 Boharron Drive
Menlo Park, CA 94025
415/329-0500
Cosmic Osmo

Adobe Systems, Inc.
1585 Charleston Road
P.O. Box 7900
Mountain View, CA 94039
800/833-6687
415/961-4400
Illustrator
Photoshop

Aladdin Systems, Inc.
Deer Park Center, Suite 23A-171
Aptos, CA 95003
408/685-9175
StuffIt Deluxe

Aldus Corp.
411 First Avenue S, Suite 200
Seattle, WA 98104
800/333-2538
206/622-5500
PageMaker

ALSoft, Inc.
P.O. Box 927
Spring, TX 77383
800/257-6381
713/353-4090
DiskExpress II

Apple Computer, Inc.
20525 Mariani Drive
Cupertino, CA 95014
800/776-2333
408/992-1010
Apple IIe
Apple IIGS
AppleShare
AppleTalk
Data Access Language (DAL)
ImageWriter
InterNet Router
LaserWriter IIg
LaserWriter IINT
LocalTalk
Macintosh Classic
Macintosh LC
Macintosh Plus
Macintosh Portable
Macintosh PowerBooks
Macintosh Quadra
Quadra 900
Macintosh SE
Macintosh SE/30
Macintosh II
Macintosh IIci
Macintosh IIcx
Macintosh IIfx
Macintosh IIsi
MacTCP
Monitor, 21" Color Display
OneScanner
QuickTime
Scanner

Bowker Electronic Publishing
R.R. Bowker Co.
245 West 17th Street
New York, NY 10011
800/323-3288
212/337-6989
Books in Print Plus

Britannica Software Inc.
345 Fourth Street
San Francisco, CA 94107
415/597-5555
Compton's MultiMedia Encyclopedia

Brøderbund Software, Inc.
17 Paul Drive
San Rafael, CA 94903
800/521-6263
415/492-3500
TypeStyler

Caere Corp.
100 Cooper Court
Los Gatos, CA 95030
800/535-7226
408/395-7000
OmniPage
Typist

Cambridge Scientific Computing
875 Massachusetts Avenue, Suite 41
Cambridge, MA 02139
617/491-6862
ChemDraw
Chem3D

CE Software, Inc.
P.O. Box 65580
West Des Moines, IA 50265
515/224-1995
Calendar Maker
Disktop
QuicKeys

Chemical Abstracts Service (CAS)
P.O. Box 3012
Columbus, OH 43210
614/447-3600
STN International

Claris Corp.
5201 Patrick Henry Drive
Box 58168
Santa Clara, CA 95052-8168
800/544-8554
408/727-8227
FileMaker Pro
HyperCard
MacDraw II, Pro
MacWrite II

COMpanion
3755 Evelyn Drive
Salt Lake City, UT 84124
800/347-6439
801/278-6439
Alexandria

Connectix Corp.
125 Constitution Drive
Menlo Park, CA 94025
800/950-5880
415/571-5100
Virtual

Cumulative Index to Nursing & Allied Health Literature (CINAHL)
1509 Wilson Terrace
P.O. Box 871
Glendale, CA 91209-0871
818/409-8005
CINAHL

Dantz Development Corp.
1400 Shattuck Avenue, Suite 1
Berkeley, CA 94709
510/849-0293
Retrospect

Digital Equipment Corp.
146 Main Street
Maynard, MA 01754
508/493-8780
VAX
VMS

Discis Knowledge Research Inc.
45 Sheppard Avenue East, Suite 410
Toronto, Ontario, Canada M2N 5W9
416/250-6537
Discis Books

ERIC Clearinghouse on Information Resources
030 Huntington Hall
School of Education
Syracuse University
Syracuse, NY 13244-2340
ERIC

Farallon Computing
2000 Powell Street, Suite 600
Emeryville, CA 94608
510/596-9000
MediaTracks
PhoneNet
StarController model 300

Faxon Co.
15 Southwest Park
Westwood, MA 02090
617/329-3350
LINX
SC-10

Fifth Generation Systems, Inc.
10049 North Reiger Road
Baton Rouge, LA 70809
504/291-7221
800/666-2904
Suitcase II, 2.0
Super LaserSpool

Grolier Electronic Publishing
Sherman Turnpike
Danbury, CT 06816
800/356-5590
203/797-3365
Electronic Encyclopedia

IBM
Old Orchard Road
Armonk, NY 10504
800/426-2468
914/765-1900
Model 9370
PC
ToolBook

Institute for Scientific Information
3501 Market Street
Philadelphia, PA 19104
216/386-0100
Current Contents

La Cie Ltd.
19552 S.W. 90th Ct.
Tulatin, OR 97062
800/999-0143
503/691-0771
Color scanner

Lifetree Software
33 New Montgomery Street, Suite 1260
San Francisco, CA 94105
800/543-3873
415/541-7864
Correct Grammar

Macromedia, Inc.
600 Townsend Street, Suite 310W
San Francisco, CA 94103
415/442-0200
Director
MacRecorder

Manhattan Graphics
250 East Hartsdale Avenue
Hartsdale, NY 10530
800/572-6533
914/769-2800
Ready,Set,Go!

Microsoft Corp.
One Microsoft Way
Redmond, WA 98052
800/426-9400
206/882-8080
Bookshelf
DOS
Excel
Office
Word
Works

MITEM Corp.
2105 Hamilton Avenue, Suite 190
San Jose, CA 95125
408/559-8801
MitemView

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
703/487-4650
Grateful Med

OCLC, Inc.
6565 Frantz Road
Dublin, OH 43017-0702
800/848-5878
(614) 764 6000
InterLibrary Loan Subsystem
Primary Journals Online
SCientific Electronic Publishing and TExt Retrieval (SCEPTER)

On Technology, Inc.
155 Second Street
Cambridge, MA 02141
617/876-0900
On Location

Personal Bibliographic Software, Inc.
P.O. Box 4250
Ann Arbor, MI 48106
313/996-1580
Pro-Cite

Quark, Inc.
300 South Jackson Street, Suite 100
Denver, CO 80209
800/356-9363
303/934-2211
QuarkXPress

Radius, Inc.
1710 Fortune Drive
San Jose, CA 95131
800/227-2795
408/434-1010
Large Screen Monitor

Research Libraries Group, Inc. (RLG)
1200 Villa Street
Mountain View, CA 94041-1100
415/962-9951
ARIEL

Salient Software
124 University Avenue, Suite 300
Palo Alto, CA 94301
415/321-5375
DiskDoubler

Softshell International, Ltd.
2754 Compass Drive, Suite 375
Grand Junction, CO 87506
303/242-7502
ChemConnection

Software Toolworks
60 Leveroni Court
Novato, CA 94949
415/883-3000
World Atlas

Symantec Corp.
10201 Torre Avenue
Cupertino, CA 95014
800/441-7234
408/253-9600
Lightspeed (THINK) Pascal
Norton Utilities for Macintosh
Symantec Anti-Virus for Macintosh (SAM)
Symantec Utilities for Macintosh (SUM II)

Voyager Co.
1351 Pacific Coast Highway
Santa Monica, CA 90401
800/446-2001
Beethoven's 9th Symphony CD Companion

Wayzata Technology, Inc.
P.O. Box 87
16221 Main Avenue SE
Prior Lake, MN 55372
800/735-7321
612/447-7321
Generous Efforts of Many (GEM)

Index

e

f

g

h

i

j

k

l

m

n

o

p

q

r

s

t

u

V

W

X

Y–Z

About The Editors

Photo by Steve Bloom

EDWARD J. VALAUSKAS, shown above entertaining the troops during the failed coup attempt in Moscow in August 1991 (he's the guy without the uniform on the right), is founder and co-editor of *Macintoshed Libraries*. He's responsible for the major editing and indexing chores and has never been known to turn down a good manuscript. Although he has recently transplanted himself to the Lone Star State, there have been reports of Ed sightings in the Chicagoland area (primarily by his wife). You can almost always find him lurking electronically on AppleLink and various forums of the Internet. You can reach Ed at the following address:

Superconducting Super Collider Laboratory
Physics Research Divison
2550 Beckleymeade Avenue, MS2010
Dallas, TX 75237-3997
Phone: 214/708-6236
AppleLink: G0094
Internet: valauskas@sscvx1.ssc.gov
Bitnet: VALAUSKAS@SSCVX1
HEPnet: SSCVX1::VALAUSKAS

Vaccaro Family Archives

Bill Vaccaro, shown above as a mere youth with a tiger (cat) nearly by the tail, is the other half of *Macintoshed Libraries* dynamic editing duo. Bill's editing chores include the design of these pages in the print version you're looking at right now. You'll also see his hand (as well as the sweat of his brow) in the electronic edition of this publication which is available as as colorful HyperCard 2.1 stack. A PostScript junkie in his spare time, he swears he recently got a fortune cookie saying there was a Quadra in his future. In another life, he is Assistant Head of the Serials Department at the Chicago Public Library's Conrad Sulzer Regional Library branch. Fan mail addressed to Bill can be sent to:

Conrad Sulzer Regional Library
4455 North Lincoln Avenue
Chicago, IL 60625
Phone: 312/744-7616
Fax: 312/744-2899
ALUG Online on The WELL: bvaccaro
Bitnet: bvaccaro@well.sf.ca.us
AppleLink: VACCARO.B
CompuServe: 76266,147
Internet: vaccaro.b@applelink.apple.com

TOOLBOX

HARDWARE

Macintosh Portable, 5 Mb RAM, 40 Mb HD; Macintosh IIcx, 8 Mb RAM, 80Mb HD, Apple Portrait Display and Portrait Display card; Macintosh LC, 4 Mb RAM, 40 Mb HD, Apple 12" Color Monitor; Ehman 45 Removable Hard Drive; Apple Portable 2400 Modem (Portable); Apple OneScanner; Apple 80HDSC Internal Hard Drives (IIcx and Portable); Jasmine Direct Drive 80 Mb Hard Disk (Portable); AppleCD SC Drive (Portable and IIcx).

SOFTWARE

System 7.0.1 (operating system); Claris *MacWrite II* 1.1 and Microsoft *Word* 5.0 (word processing); *AppleLink*, Software Ventures *Microphone II* 4.0, and Freesoft Corp. *White Knight* 11.14 (telecommunications); *FlashIt* v. 2.1 and 2.2b1 control device (screen capture - shareware); Aldus *PageMaker* 4.2 (page layout); Fifth Generation *Suitcase* 2.0 and Adobe *Type Manager* 2.0.3 (font management); Claris *MacDraw II* 1.1 and Aldus *SuperPaint* 3.0 (bitmap and PICT graphic editing and touchup); Light Source Inc. *Ofoto* (grayscale TIFF scans of photographs); Adobe *Photoshop* 2.0.1 (cover art and touch-up of TIFF scans of photographs).

TYPE

Body text

Adobe Garamond (Adobe)	Gill Sans Bold Italic (Monotype)
Adobe Garamond Italic (Adobe)	Gill Sans Condensed (Monotype)
Adobe Garamond Semibold (Adobe)	Gill Sans Bold Condensed (Monotype)
Copperplate Gothic 33bc (Adobe)	Lucian BT (Bitstream)
Gill Sans (Monotype)	Lucian BT Bold (Bitstream)
Gill Sans Italic (Monotype)	Trade Gothic Condensed Eighteen (Adobe)
Gill Sans Bold (Monotype)	Trade Gothic Bold Condensed Twenty (Adobe)

Display Text Faces

Arcadia (Adobe)	Gill Sans Condensed (Monotype)
Copperplate Gothic 33bc (Adobe)	Gill Sans Bold Condensed (Monotype)
Industria Solid (Adobe)	Gill Sans Italic (Monotype)
Lithos (Adobe)	Oz Handicraft (Bitstream)
Lucian BT Bold (Bitstream)	RansomNote (freeware)

Snell Roundhand (Adobe)

MISCELLANEOUS

The image of John M. Meador, Jr. is a grayscale TIFF file supplied by the author. All other scanned images were produced on an Apple OneScanner using *Ofoto* 1.1 software.

OUTPUT

Camera-ready proofs were produced on an Apple LaserWriter IIg laser printer with 5 Mb RAM and printed on Hammerhill Bond Laser Print white long grain S24/60 8 ½ x 11 paper. Reproduction was done using traditional photomechanical methods.