DESIDOC Bulletin of Information Technology, Vol. 16, No. 3, May 1996, pp. 11-20
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Internet Services : An Introduction

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ABSTRACT

This article provides information on the various segments of Internet, and also on how to go about various protocols needed for acquiring information from this vast 'networks of networks'. A sample browsing session is also described.

1. INTRODUCTION

The Internet connects thousands of computers and computer networks worldwide. It provides a relatively easy way to communicate and exchange information. However, as the Internet is continually increasing both in size and complexity, it is becoming more difficult to use the Internet's resources. As a result, a number of software tools have been developed to help users to navigate the Internet and its vast store of information. Librarians and information professionals use the Internet for various reasons. As a reference tool, the Internet offers a wealth of resources, up-to-date, accurate, and unavailable in any bound volume.

The Internet gives direct access to specialists in hundreds of disciplines, who are quite willing to help with both the most mundane and the most difficult problems faced by librarians and their patrons. As a communications device, the Internet allows librarians to send messages and documents to each other without being constrained by mail, telegraph, or fax. Different tools have been developed over the years for accessing the variety of resources on the Internet. These include basic tools like e-mail, telnet and ftp and also the advanced navigational tools like archie, gopher, Wide Area Information Servers (WAIS), and the World Wide Web (WWW). The following provides a brief description of each tool. Other Internet resources such as discussion lists, online library catalogues, and electronic journals are also described.

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2. INTERNET ACCESS TOOLS

2.1 Electronic Mail (e-mail)

E-mail is the oldest method of communication on Internet. Using e-mail, one can send messages (or even files) to anyone on the Internet. In order to send e-mail to a person, you need his/her e-mail address. Internet e-mail addresses are of the form: user@host.domain. The 'host.domain' unambiguously identifies a host.

Example : *raja@ncsi.iisc.ernet.in.* where 'raja' is the user name, 'ncsi' is the host name and 'iisc.ernet.in' is the domain.

Other example: *garfield@aurora.cis.upenn edu, amohindru@cas.org*. Here, 'in', 'edu' and 'org' are top level domain names indicating 'India', 'educational institution' in USA and

'organisation' in USA, respectively. Following are some more top level domain names :

com - Commercial sites in USA

gov - US Government sites

net - Network administrative organisations

mil - US military sites

fr - France

au - Australia

uk - United Kingdom

Different e-mail interface programs exist for sending and reading mails. These include 'mail', 'mailx', 'pine', 'elm' for Unix computers, and 'eudora', 'pcpine', 'ccmail' for Windows.

In addition to personal messages, e-mail has been used for operation of discussion forums (listservs or mail servers), electronic newsletters, electronic journals and e-mail based information servers. PACS-L (Public Access Computer Systems List) operated at University of Houston, USA (to subscribe : send e-mail message 'subscribe pacs-l your name' to listserv@uhupvm1.uh.edu) and LIS-FORUM (e-mail forum for L & I services in Asia) operated at NCSI, Indian Institute of Science, Bangalore (to subscribe send e-mail message 'subscribe lis-forum your name' to listserv@ncsi.iisc.ernet.in) are two examples of discussion forums in library and information science. PACS-Forum and PACS-Review are similar examples in this area for electronic newsletters and journals, managed by the same group in University of Houston that operates PACS-L list. Examples of e-mail based info/ database servers include cancernet@icicb.ncsi. nih.gov (operated by the National Cancer Institute, USA) which provide e-mail users with search and retrieve facility. An e-mail 'help' message to these addresses will provide more details for accessing these servers. E-mail gateways also exist for providing Ftp, Gopher and WWW access through e-mail.

2.2 Telnet

Telnet is a utility which will allow you to log on to another system and use various services available on that host. With telnet, the commands that you type on our keyboard are sent from your terminal to the remote computer that you have accessed. You can telnet into huge databases to do research, or even telnet into libraries around the world to check if they have a certain book that you are looking for. Telnet also offers easy entry into the worlds of gophers and the World Wide Web (discussed below) for those people who may not otherwise have access to these tools. Telnet addresses look something like this:

a) domain name: melvyl.ucop.edu
IP address : 192.35.222.222 (University of California library catalogue)

b) domain name : locis.loc.gov
IP address : 140.147.254.3 (Library of Congress)

It may be seen that Telnet addresses can be in domain name format or in IP address format. There are seven steps to a successful Telnet session :

Start-up the Telnet program

Give the Telnet program an address to connect to. Make a note of what the 'escape character' is

Log into the remote computer Set the 'terminal emulation'

Play around on the remote computer

Quit

A sample session showing access to the Melvyl library catalogue is shown in Annexure 1.

2.3 File Transfer through File Transfer Protocol (Ftp)

As the name suggests, ftp is a tool to copy files from a remote computer on Internet to your computer and vice versa. What type of files are available through ftp? These include computer software, games, documents, data, etc. One can also find files containing details about the Internet itself.

The basic steps in a ftp session are :

Start-up your ftp client programme

Give your ftp client an address to connect to

Identify yourself to the remote site

Give the remote site your password

Look around the directory for files

Change directories

Set the transfer mode

Get the file(s) you want

Quit

A sample ftp session is shown in Annexure 2.

Anonymous ftp

Ftp has made it possible to set up publicly accessible archives on Internet with all kinds of documents and software, true to the spirit of Internet, through what are known as anonymous ftp sites. Most of the academic institutes make available material, which they think might be of interest to others, on their systems. The material is held online on the computers and can be accessed by anybody having Internet connection. Ftp access is granted to everyone under the user name 'anonymous' using the e-mail address as the password. Anonymous ftp has thus become associated with accessing, browsing and transferring material from these sites.

2.4 Archie

Archie system enables locating files on the anonymous ftp servers on the Internet. Archie servers maintain an index of directory listings of known anonymous ftp servers and the index can be searched using archie client programs. An archie search for a particular file or program gives a list of Internet addresses of ftp sites along with the sub-directories where the file is located. These files can then be downloaded using ftp. Archie servers access all the known ftp servers from time to time and get the listing of files and directories to maintain the indexes.

2.5 Gopher

Gopher is a computerised agent working over the Internet to bring all sorts of useful facts to the user's desktop. It was started at the University of Minnesota as a way to deliver information online. The inventors of gopher wanted everyday users to be able to find text files easily and display them on their desktop computers, without having to know the entire process of connecting and disconnecting to other computers. The gopher universe includes over 1100 servers around the world, each with a collection of menus and documents.

Gopher divides the digital world into clients and servers. A 'client' may be any sort of computer—a PC, a Macintosh, a workstation, or a UNIX box. Gopher's client software runs on your desktop computer. Local Area Networks (LANs) and the Internet connect the desktop computers with gopher 'servers'. The client software determines how a file will look on the screen. Electronic bookmarks can be created to help users keep their place in menus or documents; documents can be saved and printed as required.

Gopher works in a world of files and menus. When a user connects to a gopher server, a set of messages tells the server what the user wants to view. For example, the user may see a menu with several sub menus. The server reads the message from the user's computer, sends the information about the menu and sub menus, and disconnects. The user can open up a menu and see that document of interest. To scan the document, the user re-opens the connection to read or print the document. At present, these documents are usually simple text files without special components, so they are easy to maintain and retrieve. The next version, the gopher + software, will handle other formats also. Gopher is a tool for browsers, and it can work in the background while your computer does other work. Gopher servers around the world handle millions of questions a week due to simple design.

There is a wide variety of gopher documents, and there are descriptions for each kind of document. These descriptions point to information that might be stored on the hard disk of a machine right around the corner, or a machine halfway around the world. Gopher might be used to access a database of telephone numbers or to download files archived in a variety of formats. Gopher handles all of the network details, so a user can go from the Library of Congress catalogue to an online thesaurus to a weather report with a few clicks of a button. Sample gopher menus from the

Give the remote site your password

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University of Michigan gopher server are given in Annexure 3.

Finding sources like these in gopher can be very difficult because of its menu and sub menu structure. Researchers in Nevada created 'veronica' to address this problem. Veronica stands for 'Very Easy Rodent Online Network Information by Computer Access'. Veronica is a keyword index to all the menu titles, sub menu titles, and document titles in gopher, and it is updated monthly. It can be searched via gopher menu selection.

Besides reference works, gopher also offers access to electronic texts, thus providing digital access, say to the complete works of 'Lewis Carol'. For example, in the 'Electronic Books' sub menu of the University of Minnesota Internet gopher, there are books by Thomas Hardy, Herman Melville, and Willa Cather.

2.6 WAIS

WAIS, or Wide Area Information Servers, allows users to search indexed text on a number of servers. WAIS servers are identified by using a directory. There are some 340 WAIS servers providing access to some 200 databases. One or two databases are added to WAIS each day from around the world; there are servers in at least eight countries, and users in over 25 different countries.

With WAIS, one uses a computer to search in natural language among all the servers and indexed documents. The computer returns a list that sets out the relevancy of each hit in against the user's search terms. The relevancy is based on the difference between the keywords given by the user and the frequency of their appearance in an indexed document. The search query can be repeated to different servers. News, science, and literature are the strengths of WAIS. Indexed files may fill only ten megabytes on a personal computer or include hundreds of megabytes and reside on a parallel super computer. WAIS is less effective with very specific questions, or with questions on topics not yet covered by any server. WAIS is different from gopher in that it connects the user directly with indexed documents, and in that its directory of servers gives you some idea of the kind of resources available to you in advance.

2.7 The World Wide Web

The World Wide Web, referred to as WWW or simply the Web, is a client-server based distributed hypertext multimedia information system on the Internet. It was originally developed at the European Particle Physics Laboratory (CERN), Geneva. It has now become the most popular navigation tool on the Internet. The National Centre for Supercomputing Applications (NCSA), University of Illinois, USA, improved upon the CERN work by developing a graphical client for the Web named Mosaic for Unix X-Windows platform, which was later made available for MS-Windows also. Now a number of Web clients are available for different operating systems. These include, for example, Lynx (a full-screen text based client), Netscape, Cello, WinWeb, etc. WWW uses a protocol called HTTP (hypertext transfer protocol) for transferring documents from Web servers to Web clients.

The Web servers maintain information in the Web pages, which are simple ASCII files with the text marked-up with HTML (HyperText Mark-up Language) tags. HTML has tags for providing references to other Web pages, which can be on the same server or any other server on the Internet. Web pages can contain references to images (in GIF and JPEG formats), audio files (AU format) and video files (in MPEG format) which gives multimedia dimension to the information provided on the Web. The clients access the Web pages on the servers, render and format them according to the HTML tags for display on the client's system. When a user selects a hypertext link (indicated with an underscore or an icon) on the Web page, client can follow the link and fetch the referred document irrespective of its location on the Internet.

The location of documents on the Web pages is specified by the URL (Uniform Resource Locator) which is a simple way of describing almost any information resource using a standard format for locating information on the Internet. The format includes

specification of the resource preceded by the protocol that must be used to access the resource. For example,

telnet://melvyl.ucop.edu

ftp://ftp.sura.net

gopher://gopher.microsoft.com

http://www.byte.com

All the web browsers provide facilities like maintaining the history of the hyper links across the Net, bookmarking the URLs of information sources for later reference, saving the web page, search for a string within the displayed web page, configuring the Web browser for playing multimedia document objects, etc.

Screen images of a session with the NCSTRL computer science technical report server (http://www.ncstrl.org) using the Netscape browser is shown in figures 1 to 8 at the end of this article.

3. INTERNET RESOURCES

3.1 Online Library Catalogues

A gopher menu offers access to libraries with library catalogues in different countries. Gopher provides prompts that permit a user to reach a library catalogue.

The Internet gives access to the bibliographic records of millions of books, and details on the holdings of academic and research libraries around the world. With these resources, a librarian can verify bibliographic information, locate an obscure title or paper for a user, construct bibliographies, and compare subjects specialities of libraries in different countries. One can also check on new titles, and even order them from a number of university presses. Blackwell North America makes available a catalogue of books in print, and the inventories of several bookstores are also available online.

3.2 Discussion Lists

There are hundreds of electronic discussion lists and conference proceedings available over the Internet. They give users direct access to scholars in disciplines as different as folklore, animation, medieval history, climatology, and economics. More than 100 discussion lists are available specifically for librarians. The Special Library Association, the American Library Association, and other organisations support electronic conferences devoted to topics as diverse as rare books, maps, difficult reference questions, and conservation. It would be impossible to subscribe to all discussion lists. A recent survey indicated that special librarians on an average subscribe to a little more than three discussion lists per person.

Discussion lists give users an opportunity to ask or offer help. Librarians can post complicated reference questions to listservs and have access to the expertise of librarians located in institutions across the United States, Europe, Central and South America, and Australia. A reply may appear in minutes. In the discussion related to e-mail in section 2.1 above, we referred to two discussion lists PACS-L and LIS-FORUM.

3.3 Electronic Journals and Newsletters

There are hundreds of electronic journals and newsletters on the Internet. They cover such diverse topics as beans, ancient Greece, astronomy, tourism, medicine, and philosophy. These journals are like their printed counterparts in that they appear on a regular schedule, have a team of editors and reviewers, and focus on a specific topic. Many also publish original research. Some electronic journals appear in both paper and electronic editions, including the biweekly newspaper *The Scientist* and the journal *Postmodern Culture*. Only six electronic journals charge a subscription, although printed editions of many journals carry a fee while their electronic counterparts do not. Traditional newspapers are becoming available in certain networks but they are not yet accessible on the larger Internet. For instance, the National Capital Freenet in Ottawa, Canada, makes *The Ottawa Citizen* available electronically, and the Cleveland Freenet provides *USA Today*. The *Mercury-News* from San Jose, California and other newspapers can also be found on America Online.

For librarians, electronic journals such as *Public-Access Computer Systems Review* (which grew out of a discussion list) and *Current Cites*

give the latest information on the use of technology in libraries.

4. CONCLUSION

The Internet offers possibilities for interaction not available through any other technology. A librarian can take advantage of materials that may be physically located thousands of kilometres away. It can decrease demands of distance and time, and bring together intellectual and physical resources. It is not surprising that the Internet is being embraced b librarians around the world.

5. REFERENCES

This paper has been prepared largely usin material available over the Internet and th course material on 'Internet for Information Professionals (IFIP)', prepared by NCSI for a workshop on the same topic conducted durin July and September, 1995.

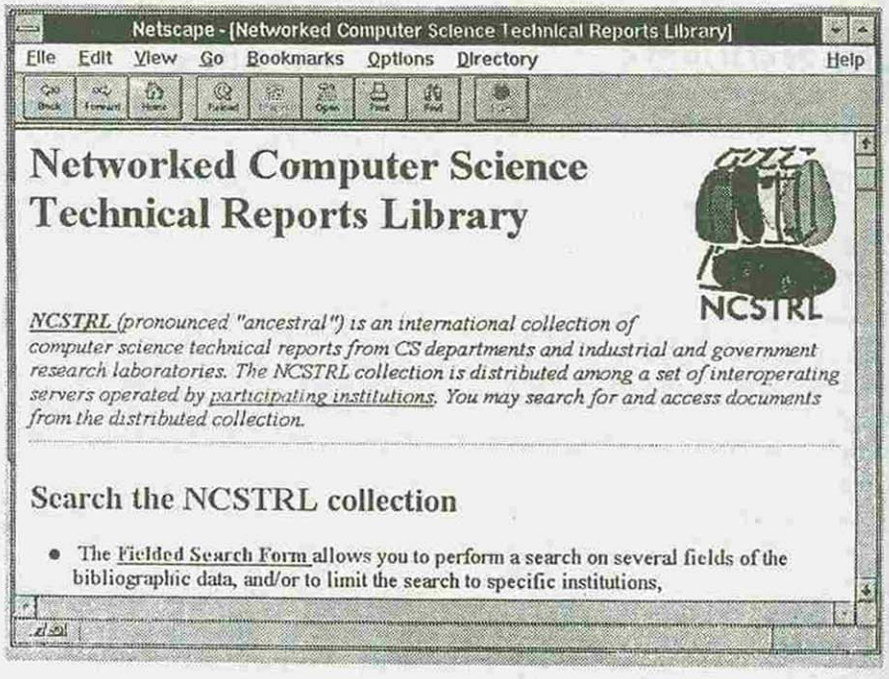

Fig.1 NCSTRL — Portion of Opening Screen (http://www ncstrl.org)

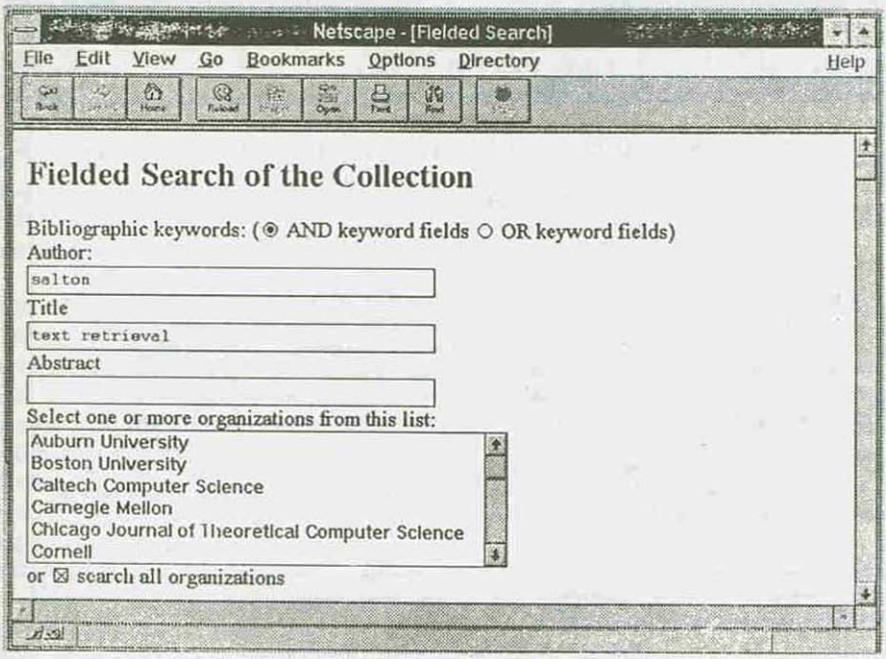

Fig. 2 NCSTRL — Sample Search for Papers by 'Salton' on 'Text Retrieval'

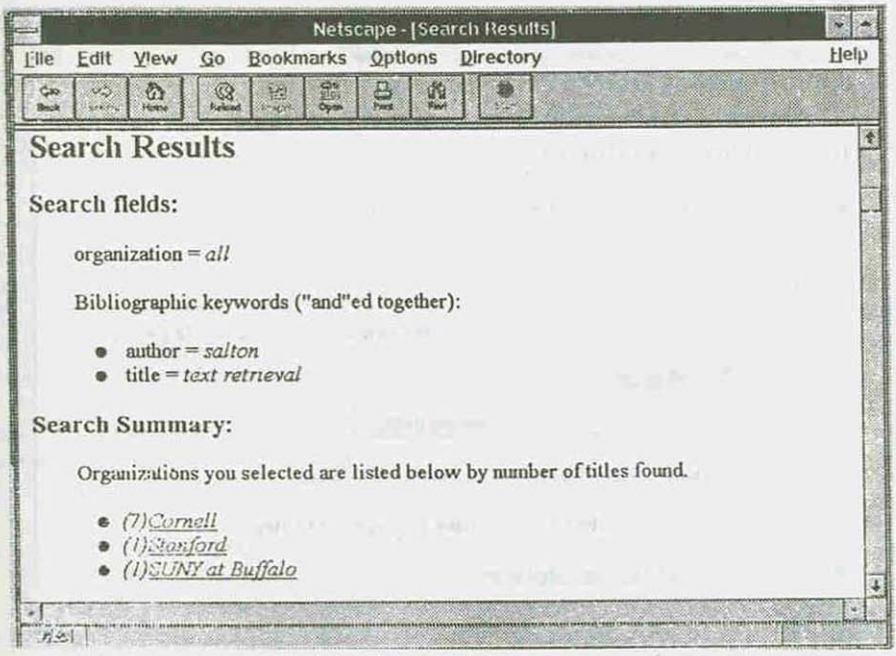

Fig. 3 — NCSTRL - Search Result Screens

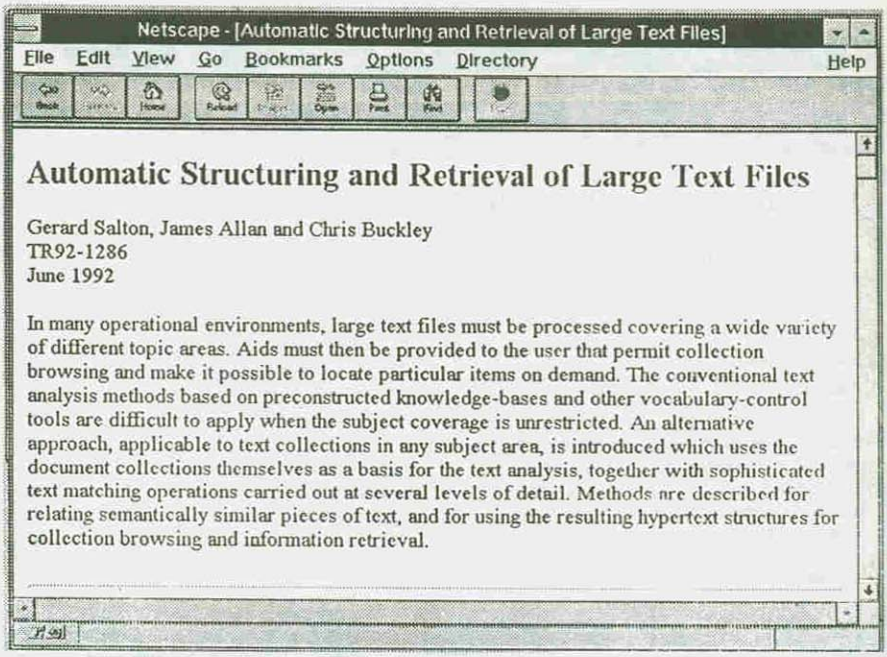

FIG. 4 — NCSTRL Retrieving the Abstract

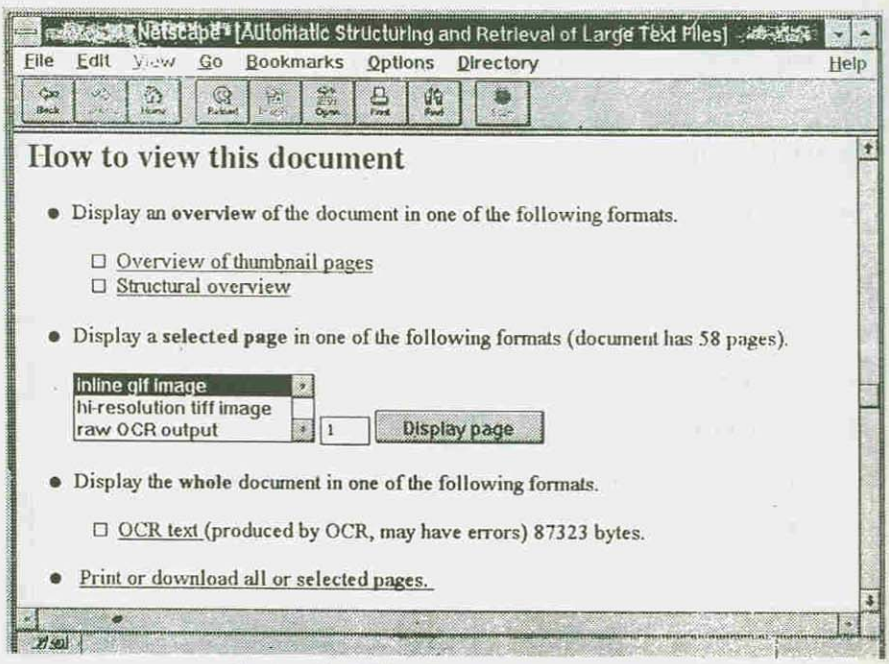

Fig. 5 — NCSTRL - Document View Options

Annexure –1

Searching the Melvyl Library Catalogue Database

$telnet 192.35.222.222
Trying 192.35.222.222...
Connected to 192.35.222.222.
Escape character is '^]'.
DLA LINE 39 (TELNET) 02:50:03 02/20/95 (MELVYL.UCOP.EDU)
Please Enter Your Terminal Type Code or Type? for a List of Codes.
TERMINAL? vt100
Press RETURN for the MELVYL System⇒
Welcome to the University of California's MELVYL* LIBRARY SYSTEM
-Catalog of books for UC and California State Library
-Catalog of periodicals titles for UC and academic libraries of California
-Journal article information, abstracts, and text in major subject areas
-Internet access to databases and systems across the world
©1984. *Registered trademark of The Regents of the University of California.

To select a database for searching: press RETURN
For help getting started: type HELP and press RETURN

Databases and Systems

TEN: (MELVYL Ten-Year Catalog–books, music, maps, audiovisuals, etc.)
CAT: (MELVYL Full Catalog–books, music, maps, audiovisuals, etc.)
GEN: (General–book catalogues and article databases)
BIOMED: (Biomedical databases)
HUM: (Humanities)
BUS: (Business), SCI: (Science/Engineering), GOV: (Government/Legal), SOC (Social Sciences), ALPHA: (Alphabetical list of all databases and systems), and DBTYPE: (Databases and systems listed by type)
If you know the name of the database or system you want, type the name. Otherwise, select an option from the list. Type HELP for assistance.
⇒Ten
Command being issued: START TEN
Welcome to the MELVYL TEN-YEAR Catalog Database
Contents: As of 2/20/95, approximately 1,637,652 titles representing 3,497,100 holdings for materials in the University of California libraries, and the California State Library

OPTIONS: Type an option and press RETURN, or type any command.
HELP - For help in getting started.
E GUIDE - For a brief guide to using the Ten-Year database.
START - To start over or change databases.
END - To end your session.
TEN⇒help
You can use the TEN-YEAR database with two basic commands:
FIND [index] [search words]: to begin a search
DISPLAY: to display the results of a search.
For example: FIND SUBJECT JOB STRESS
For more information, type EXPLAIN FIND or EXPLAIN DISPLAY.
For a list of indexes in the TEN-YEAR database, type EXPLAIN INDEXES.
For a list of commands in the TEN-YEAR database, type EXPLAIN COMMANDS.

OPTIONS: Type an option and press RETURN.
EXP TEN - For an explanation of database contents.
EXP GUIDE - For a guide to searching the database.
START - To start over or change databases.
END - To end your session.
Or type any command.
TEN⇒find subject neuroscience
Search request: FIND SUBJECT NEUROSCIENCE
Search result: 81 records in the TEN-YEAR Catalog database
Type D to display results, or type HELP.

TEN⇒d
Search request: FIND SUBJECT NEUROSCIENCE
Search result: 81 records in the TEN-YEAR Catalog database
Type HELP for other display options.

1. DISSERTATION
Aboitiz, Francisco Dominguez.
Quantitative morphology and histology of the human corpus callosum and its relation to brain lateralisation/by Francisco Dominguez Aboitiz. 1991.
UCLA Biomed W4C A154q 1991
Ten⇒end

Annexure 2

A Sample Ftp Session

Here is a sample anonymous ftp session in which a file called library guide is retrieved from samba.oit.unc.edu Commands typed by the user are shown in bold italics.

$ ftp samba.oit.unc.edu
Connected to samba.oit.unc.edu.
220 samba.oit.unc.edu Ftp server (Ultrix Version 4.36 Thu Dec 29 22:53:11 EST 1992) ready.
Name (samba.oit.unc.edu:pjones): ***anonymous***
331 Guest login ok, send your e-mail address as password.
Password:type your e-mail address here–it will be hidden
230 Guest login ok, access restrictions apply.
ftp ***ls***
200 PORT command successful.
150 Opening data connection for /bin/ls (128.109.157.70,4260) (0 bytes).
bin
pub
uploads
226 Transfer complete.
36 bytes received in 0.23 seconds (0.15 Kbytes/s)
ftp ***cd pub***
250 CWD command successful.
ftp ***ls***
200 PORT command successful.
150 Opening data connection for /bin/ls (128.109.157.70,4261) (0 bytes).
docs
msdos
unix
vms
226 Transfer complete.
103 bytes received in 0.21 seconds (0.48 Kbytes/s)
ftp ***cd docs***
250 CWD command successful.
ftp ***ls***
200 PORT command successful.
150 Opening data connection for /bin/ls (128.109.157.70,4262) (0 bytes).
hitch.hiker
library.guide
other.anonymice
tcpip.intro
226 Transfer complete.
188 bytes received in 0.11 seconds (1.64 Kbytes/s)
ftp ***get library.guide***
200 PORT command successful.
150 Opening data connection for library.guide (128.109.157.70,4263) (45172 bytes).
226 Transfer complete.
local: library.guide remote: library.guide
46571 bytes received in 0.66 seconds (69.02 Kbytes/s)
ftp ***quit***

Annexure 3

University of Michigan Gopher

URL : //gopher.umich.edu
Gopher Menu
- About GopherBLUE
- Information Technology Policies and Guidelines
- Job Postings
- **Phone Book (X.500)**
- News and Weather
- **Library Resources (ULibrary)**
- Computing on Campus
- U of Michigan and Ann Arbor
- Software Archives
- Internet Resources
- Other Gopher Servers

Gopher Menu
- About Using the ULibrary Gopher
- Contents of the ULibrary Gopher
- About University Michigan Libraries and Information Resources
- News Services and Government Information
- Dissertations and Other Indexes
- General Reference Resources
- Humanities Resources
- Science Resources
- Social Sciences Resources
- Library Catalogues
- University Michigan Campus Information (GopherBLUE)
- Other Gophers and Veronica
- What's New and Featured Resources

Gopher Menu
- Search Phone Book
- About Phone Book
- Add Your Electronic Mail Address
- View and Change Your X.500 Entry
- Finger Services at the University of Michigan
- X.500 Gateway (search other places)
- Phone Books at Other Institutions
- More Information on X.500