NorthWestNet

User Services Internet Resource Guide (NUSIRG)

Third Edition

March,1992

On-Line PostScript Version 1.0, March 24, 1992

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A product of NorthWestNet and the Northwest Academic Computing Consortium, Inc.

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How To Get NUSIRG

THE NORTHWESTNET USER SERVICES INTERNET RESOURCE GUIDE

You can either get NUSIRG at no charge by the Internet "File Transfer Protocol" (FTP), or you can purchase a bound copy from NorthWestNet. If you have a connection to the Internet, you are encouraged to follow these instructions for using FTP to obtain NUSIRG. If you can't use FTP (or don't know how yet!), instructions on how to order a printed and bound copy from NorthWestNet are included on the next page.

Free Copies of NUSIRG By File Transfer Protocol (FTP)

NUSIRG is available at no charge, by FTP, as text-only or PostScript files. The text-only files are in a simple format which can be printed by most kinds of printers or viewed on-screen with most text editors. The PostScript files produce output which is essentially identical to the bound version of NUSIRG.

If you have access to a computer connected to the Internet, all you have to do is follow the simple instructions below.

Note: commands you type are shown in the left hand column in lower case (don't type the #'s!);
UPPER CASE and ">" indicates prompts from the computer that will appear on your screen.

What you type (or what you'll see)	Explanation
1) ftp ftphost.nwnet.net	Connect to the NorthWestNet FTP host.
2) LOGIN: anonymous	At the "LOGIN:" prompt enter "anonymous".
3) PASSWORD: your-user-id@address	At the "PASSWORD:" prompt, please enter your user-id@your.full.internet.address (e.g., robessin@uwvvd.derrg.edu).
4) FTP> cd nic/nwnet/user-guide	Change directories (cd) to the directory containing FTP copies of NUSIRG.
5) FTP> get README.nusirg	Use the "get" command followed by a filename from the list on the next page to copy a file; get "README.nusirg" first, which contains the most up-to-date information about NUSIRG files.
6) FTP> ls	The "ls" command will produce a listing of the names of the files in the NUSIRG directory (see below).
7) FTP> quit	The "quit" command will end your FTP session.

The file "README.nusirg" contains more detailed information about the files in the NUSIRG directory.

Files in the NUSIRG directory	Description of file's contents
README.nusirg	A detailed description of NUSIRG files.
nusirg.beginner.overview.ps nusirg.beginner.overview.txt	Overview of NUSIRG and the Internet.
nusirg.email.ftp.telnet.ps nusirg.email.ftp.telnet.txt	Basic Internet tools: e-mail, FTP, TELNET.
nusirg.listserv.usenet.ps nusirg.listserv.usenet.txt	Using USENET and LISTSERV.
nusirg.online.info.resources.ps nusirg.online.info.resources.txt	Electronic books, libraries, databases, etc.
nusirg.supercomputers.ps nusirg.supercomputers.txt	Supercomputer use and access information.
nusirg.teach.k-12.ps nusirg.teach.k-12.txt	The Internet and K-12 education.
nusirg.whole-guide.ps.tar.Z nusirg.whole-guide.txt.tar.Z	All of NUSIRG in compressed and archived format.

Notice that the file names above occur in pairs differing only in the last parts of their names. Files ending with "ps" are in PostScript format and cannot be printed unless you have access to a PostScript printer.

You should not copy the files whose names end with "tar.Z" unless you know how to handle compressed and archived files, which is explained in the file "README.nusirg".

Printed Copies From NorthWestNet

If you would prefer to purchase an already printed and bound copy (or if you are unable to use FTP), NUSIRG is available for $20.00 per copy from NorthWestNet.

postal mail: NorthWestNet
NUSIRG Orders
15400 SE 30th Place, Suite 202
Bellevue, WA 98007

e-mail: nusirg-orders@nwnet.net
phone: (206) 562-3000
fax: (206) 562-4822

Please make your check or money order payable to NorthWestNet.

If you have questions, comments, or suggestions about NUSIRG, please send e-mail to nusirg@nwnet.net

About NorthWestNet

NorthWestNet is a regional computing and digital communications network founded in 1987 by the Directors of the Northwest Academic Computing Consortium, Inc. (NWACC). The NWACC mission is to promote research, education and economic development by providing access to network communications, computing and electronic information systems and services throughout the Northwest. In 1988 NWACC was incorporated in the state of Oregon as a not-for-profit corporation. NorthWestNet is wholly owned, operated and managed by NWACC. NorthWestNet is an independent, regional sub-unit of the Interim National Research and Education Network (NREN) currently managed and operated by the National Science Foundation (NSF).

A national movement is growing to build a permanent National Research and Education Network (NREN) to enhance the nation's and each state's educational, research, and economic competitiveness and productivity. NREN is designed to provide the primary information linkage among the nation's knowledge-based organizations including higher education institutions, scientific laboratories, and industrial research units. The general architecture of NREN has three levels: a federally-sponsored interstate foundation (backbone) network; midlevel networks providing broad, regional connectivity and expected to be partially self-supporting; and self-sponsored individual campus, government agency, industrial and federal laboratory networks distributing information to their end users.

NorthWestNet is a regional (midlevel) network which is cooperatively addressing the high-performance computing and networking needs of the Northwest within the scope of the NREN policies. NorthWestNet serves higher education institutions, government agencies, not-for-profit organizations and industry in six states (Alaska, Idaho, Montana, North Dakota, Oregon and Washington). Since NorthWestNet was established in 1987, our network connectivity has expanded from 11 originator members to over 60 sites. Similar growth is expected over the next five years as NorthWestNet expands and enhances network services offerings and marketing efforts.

NorthWestNet is financially supported by a grant from the National Science Foundation (NSF), institutional membership dues and network service fees. In April 1991 the NSF confirmed renewal of NorthWestNet's core grant, first approved in 1988. Under the terms of the grant renewal, NSF has committed funds totaling nearly two million dollars distributed over the next three-year contract period. NWACC revenues and annual operating budgets for the next three fiscal years are expected to exceed one million dollars annually.

In 1989 NWACC initiated a strategic planning process to chart the future course for NWACC and NorthWestNet. The resultant plan recognizes the special needs of the northwestern United States, a geographically large, yet sparsely populated area. Current markets for NorthWestNet services are rapidly expanding and broadening, extending past the conventional education and research communities to industry, government agencies and health care organizations. Technical and operational implementation of the NorthWestNet Strategic Plan are now in progress. NorthWestNet is already upgrading network equipment, operations, and user services offerings. The NorthWestNet Network Operations Center (NOC) facilities management agreement with the University of Washington was formalized in June 1991. NorthWestNet currently offers a variety of information and user support services.

For the past three years, NorthWestNet has published for its membership an Internet Users Training Manual. This new "NorthWestNet User Services Internet Resource Guide" (NUSIRG) is another step in our user services support. NUSIRG is available in both hardcopy and electronic formats to anyone using the Internet.

Technical seminars and training courses are presented each autumn at our NorthWestNet Annual Meeting. Seminars and workshops on a variety of topics are presented by regionally and nationally recognized network engineers, communications technicians and user services specialists. A special training track for new NorthWestNet member institutions will also be offered beginning October 1991.

Workshops for researchers and scholars providing training in the use of high-performance computing systems and networked information resources are offered periodically and are also held in conjunction with our Annual Meeting.

To facilitate communication among participants in our numerous committees and working groups, NorthWestNet operates and maintains electronic mail exploders for the NWACC Board of Directors and Executive Committee, the NorthWestNet Technical Committee and Configuration Subcommittee, the User Services Committee and the Editorial Review Board.

NorthWestNet maintains and offers via anonymous FTP a modest collection of regional and national networking policies, working papers and operational documents on our network information server.

We are also vigorously pursuing the development of new programs focusing on high performance computing and parallel processing, electronic library resources and networked information services, K-12 educational networking, and health care information and delivery systems.

Over the next five years, NorthWestNet is committed to servicing the needs of its expanding membership by:

- ☐ Providing its members from education, government, not-for-profits and industry with the ability to access and to share advanced computing and information systems (especially data bases and electronic library resources) using high-speed telecommunications facilities;
- ☐ Seeking, promoting, and supporting methods and tools for assisting users to access and to share information in an interactive, convenient, integrated and easy-to-learn manner;
- ☐ Expanding NREN access to K-12 schools and education districts, health care organizations and economic development groups;
- ☐ Encouraging and enhancing education, research, and development by providing value-added network services in support of northwestern interests;
- ☐ Promoting affordable and, if possible, subsidized national, and international electronic access for all regional education and research organizations;
- ☐ Encouraging and facilitating collaboration among educational institutions, government, not-for-profit agencies and industry. Opportunities include (1) sharing computing and information resources, (2) sharing procurement and (3) transferring technology;
- ☐ Being a leader, both regionally and nationally, in the efforts to establish a regional electronic sharing of resources; and
- ☐ Being recognized by its membership and funding agencies as a provider of excellent quality services and support.

The NWACC Executive Director, on board since June 1991, has established a home office for the NorthWestNet staff in the principal market city of Seattle. The Executive Director provides leadership and manages the network under the general direction of the Executive Committee and the Board of Directors. The Executive Director's staff coordinates network operations, technical planning and management activities, network information service delivery, network user training and educational services, and marketing and general network administration.

The futures of NWACC and NorthWestNet are truly bright. In the Northwest's rapidly growing, technology-based and -driven economy, the demand for computing, electronic communications, and information services is ever increasing. With our expanded and enhanced network and computing service offerings, NorthWestNet membership and revenues are both projected to continue increasing rapidly through the mid-1990s.

Dr. Eric S. Hood
NWACC Executive Director
September 1991

NorthWestNet Acceptable Use Policy

NorthWestNet is a regional data communications network serving a consortium of universities and research groups in the northwestern United States. Its goals are summarized in the Articles of Incorporation for the Northwest Academic Computing Consortium, Inc.. All use of NorthWestNet facilities must be consistent with the goals and purposes of NorthWestNet. The intent of this statement is to describe certain uses which are consistent with the purposes of NorthWestNet, not to exhaustively enumerate all such possible uses.

Some acceptable uses of NorthWestNet facilities include:

- Use for scientific research or instruction at member and associate member institutions through the provision of high-speed data communications;
- Use as a vehicle for scholarly communications;
- Use as a means for NorthWestNet members to access remote computing resources for the purpose of scientific research or instruction. Notable examples of such resources are the NSF supercomputing facilities;
- Use necessary to support other acceptable uses. For example, administrative communications which are part of the support infrastructure needed for research and instruction are acceptable. Similarly, communications directly between non-member institutions in support of research or instruction at member institutions is acceptable;
- Use required by agreements with NSF, the primary funding agency for NorthWestNet;
- Use by member institutions as a laboratory for research and experimentation in computer communications, where such use does not interfere with production usage. However, any experimental use requiring modification to router software or protocol layers below ISO layer 4 requires prior review by the Technical Committee.

In general, commercial and general administrative use are prohibited. Use for scientific research or instruction at non-member institutions and at for-profit institutions may or may not be consistent with the purposes of NorthWestNet, and will be reviewed on a case by case basis.

Use of NorthWestNet for any illegal purpose, or to achieve unauthorized access to systems, software, or data is prohibited.

NorthWestNet is a production communications network on which many researchers depend. Uses that significantly interfere with the ability of other users to make effective use of the network are not acceptable.

Version 2.0
May 12, 1988

NSFNET Backbone Services Acceptable Use Policy

GENERAL PRINCIPLE:

(1) NSFNET Backbone services are provided to support open research and education in and among US research and instructional institutions, plus research arms of for-profit firms when engaged in open scholarly communication and research. Use for other purposes is not acceptable.

SPECIFICALLY ACCEPTABLE USES:

(2) Communication with foreign researchers and education in connection with research or instruction, as long as any network that the foreign user employs for such communication provides reciprocal access to US researchers and educators.

(3) Communication and exchange for professional development, to maintain currency, or to debate issues in a field or subfield of knowledge.

(4) Use for disciplinary-society, university-association, government-advisory, or standards activities related to the user's research and instructional activities.

(5) Use in applying for or administering grants or contracts for research or instruction, but not for other fundraising or public relations activities.

(6) Any other administrative communications or activities in direct support of research and instruction.

(7) Announcements of new products or services for use in research or instruction, but not advertising of any kind.

(8) Any traffic originating from a network of another member agency of the Federal Networking Council if the traffic meets the acceptable use policy of that agency.

(9) Communication incidental to otherwise acceptable use, except for illegal or specifically unacceptable use.

UNACCEPTABLE USES:

(10) Use for for-profit activities (consulting for pay, sales or administration of campus stores, sale of tickets to sports events, and so on), or use by for-profit institutions unless covered by the General Principle or as a specifically acceptable use.

(11) Extensive use for private or personal business.

This statement applies to use of the NSFNET Backbone only. NSF expects that connecting networks will formulate their own use policies. The NSF Division of Networking and Communications Research and Infrastructure will resolve any questions about this Policy or its interpretation.

NorthWestNet Network Operations Center (NOC)

Much recent national attention has focused on improving the quality of Internet connectivity services by enhancing "end-to-end" network management. In the three tiered hierarchy of the Internet, high priority has been placed upon the critical role of the midlevel networks in delivering quality connectivity services. "Hardening the regionals" has emerged as the phrase most often used to describe the portion of this new national initiative. Given the recent consensus regarding the importance of "end-to-end" network connectivity focused on mid-level networks, this brief summary of NorthWestNet's Network Operations Center (NOC) has been included in this Guide.

INTRODUCTION

The purpose of this document is to identify the functions that the Network Operations Center (NOC) will provide to maintain the operational integrity of the network. This document is available via anonymous ftp on ftphost.nwnet.net in local/nwnet/doc/uw-nwnet.noc.

NETWORK MONITORING, REPAIR, AND TROUBLE TRACKING

The NOC will provide real-time network monitoring and repair at the layers one (1) through four (4) in the OSI model. The link state of each NorthWestNet circuit will be queried periodically (approximately once a minute) by a Network Management Station (NMS). The NMS will be monitored 24 hours a day, 7 days a week. This NMS is expected to provide a real-time view of the entire network, and to have some rudimentary network diagnosis tools available to operators to identify common or general problems with link layer connectivity.

The level of staffing is expected to vary between primary shifts (approximately 8:00 a.m. to 6:00 p.m. Monday through Friday), and the secondary shifts (the complement of the primary shift hours). The primary shift will have skilled network analysts available and trained in more complex network diagnostic tools. These analysts will be able to assist in problem diagnosis and resolution at the Network and Transport Layers. The secondary shift operators will be expected to recognize simple circuit outages (at the Physical and Link Layers), and initiate work orders with telecommunications providers. Once an outage or problem is identified, it will be tracked with a trouble ticket system to help provide consistency across multiple shifts and to identify reoccurring problems.

CIRCUIT COMMISSIONING AND EQUIPMENT INSTALLATION

The NorthWestNet NOC will configure the equipment necessary to facilitate member connections to the network and deliver it to the member site. If the technical representative of the member institution requires additional support to complete the installation, the NOC will endeavor to assist. The NOC will also assist the public telecommunications providers in specifying and commissioning the required data circuits.

EQUIPMENT MAINTENANCE AND UPGRADE

The NOC will reconfigure and coordinate upgrades of the NorthWestNet managed equipment as necessary. In case of a hardware failure, the NOC will ship a spare to the member institution's technical representative, not later than the next business day following discovery of the problem.

DIAGNOSTIC TOOLS REPOSITORY

The NMS will act as a repository for network management tools. Tools in the public domain, developed locally by programming staff or available to the NOC through licensing agreements, will be stored on and available from the NMS.

NMS DATA COLLECTION AND ANALYSIS

The NMS periodically (approximately every 15 minutes) will query each router to retrieve a set of Management Information Base (MIB) variables that can be considered useful for diagnosis and analysis. This data will be stored on the NMS and made available for report generation or post-processing analysis. Rudimentary programs will be available to query this database and generate graphs as aids to problem diagnosis and reporting. Simple monthly reports on outages and circuit usage will also be derivable from this data.

INVENTORY AND REVISION CONTROL

The NOC will keep a database of NorthWestNet owned equipment, including serial numbers, revision levels, component types, equipment locations, etc..

DOMAIN NAME SERVICE

Upon the request of a member, the NOC will provide interim primary or continuing secondary Domain Name Service. Members may request interim primary DNS from the NOC, which implies that all host name additions, changes, or deletions be done by NOC staff. When a member site is able to provide its own primary DNS, the NOC will, if requested, continue to provide secondary DNS.

AGENCY INTERACTION

The NOC will interact with national, regional, and member network agencies, as well as telecommunications providers and equipment vendors to facilitate transitions in network topology, resolve outages, or provide other operational assistance as required.

SUPPORT FOR HUB SITES

The NOC will assist technical staff at NorthWestNet hub sites in resolving connectivity problems. This assistance will be mainly in the form of consulting by phone and e-mail.

NETWORK ENGINEERING

With consultation from and review by the NorthWestNet Technical Committee, the NOC will provide network engineering services to define and implement a network topology and architecture that will achieve NorthWestNet's connectivity and cost objectives as set forth by the NorthWestNet Management Committee.

Acknowledgements

It is perhaps appropriate that a book which is meant to demonstrate the extraordinary wealth of resources available on the Internet was written using the Internet itself as the main source of information. Only a very small set of printed books were consulted during the preparation of this document. Therefore, primary thanks go to the Internet itself, for being such a treasure trove of information!

Snippets of information were collected from tens of thousands of postings in many discussion groups, including USENET, LISTSERVers, and Internet Interest groups. I thank everyone who so willingly shares their knowledge in these forums. Reading typical questions from new Internet users posted in these forums was also invaluable for helping to determine what should be included in an entry-level Internet guide. Another useful source of information was existing, online Internet documentation written by Internet user services staff around the world, and a large number of helpful documents about the Internet written by individuals on their own initiative, and shared on the Internet.

I am very thankful to Larry Gales of the University of Washington, who wrote the chapter on Supercomputer Access, and to user services staff at the supercomputer sites for providing up-to-date descriptions of their state-of-the-art sites.

Very useful support, reviews, corrections and suggestions were provided throughout this project by the NUSIRG Editorial Review Committee: Dorette Dusterhoff, Eric Hood, Janaka Jayawardena, Dan Jordt, Dick Markwood, Paul Mauvais, Danny Raphael and Sandy Sprafka.

Special thanks go to Danny Raphael (Director of User Services, University Computing Services, University of Washington), who loaned me a Macintosh computer and a modem for the duration of this project. Most research and writing was done from my home, which became an "electronic cottage" in the global village by virtue of a simple modem connection to the Internet. This Users Guide is proof that anyone in the world can access the wealth of Internet resources from their own homes with minimal hardware and software requirements.

NUSIRG was written in three very hectic and obsessive months, July through September, 1991. I'd like to thank my friends and family for their support and understanding while I was transformed into a "virtual knowbot in cyberspace."

Jonathan Kochmer
The Cottage
Seattle, Washington
October 6, 1991

SECTION 1: NUSIRG, THE INTERNET, AND YOU

Chapter 1: Overview of the NorthWestNet User Services Internet Resource Guide (NUSIRG)

> *When people ask for education they normally mean something more than mere training, something more than mere knowledge of facts, something more than a mere diversion. Maybe they cannot themselves formulate precisely what they are looking for; but I think what they are really looking for is ideas that would make the world, and their own lives, intelligible to them. When a thing is intelligible, you have a sense of participation...*
>
> E. F. Schumaker
> *Small Is Beautiful* (pg. 84)

> *Once you get started, you'll start to understand...*
>
> Overheard in a crowd

INTRODUCTION

Most of us use complex technologies like automobiles, televisions, or telephones every day, without knowing exactly how they work. We take it for granted that when we turn on a radio we'll hear news or music, and that when we start a car we'll get to where we want to go.

Until very recently, using computer networks was like using a car in the beginning of the 20th century.

Charlie Chaplin and Buster Keaton made comedies featuring wrestling matches with temperamental cars. It was funny because everybody knew you couldn't drive to the next town without getting greasy up to your elbows at least once. The technology was still being perfected, and sometimes it was hard to get where you were going.

It was also hard to figure out how to find the places you were looking for.

There's an old joke in New England about a city slicker asking for directions from a farmer sitting on his front porch. The farmer says, "You can't get there from here." As a person who grew up in the country, I've always thought this was short for saying, "well, I could give you directions, but unless you grew up in these parts, you probably won't understand anyway...."

But things have changed with automobiles, and they're beginning to change with computer networks.

Computer networks have jumped the first hurdle on the path which all technologies must run. They are now usually very reliable. Most of the time, you can press a few buttons and know that your message will be received by someone thousands of miles away, in a few seconds. Today, global computer networks are being used daily by millions of people who don't know much more about computers than the average person knows about the inner workings of a television set.

The purpose of NUSIRG is to help network users get over the second great hurdle of new technologies: Now that computer networks are reliable, what can they be used for? And once you know what can be done, you'll learn "how to get there from here." You can think of NUSIRG as a set of basic driving lessons, and a glove compartment full of "road maps" to the many interconnected routes and valuable services that together comprise a worldwide computer network known as "The Internet" (See Chapter 2: The Internet).

WHAT IS THE INTERNET?

The Internet is a world-wide network of networks which is able to inter-connect computers ranging from the simplest PCs to the most sophisticated mainframes. Internet users can use the Internet for an extraordinary range of purposes - long distance collaborations, freely copying programs and documents to and from remote computers, accessing library catalogs, logging in to supercomputers - the list of current Internet activities is large and the range of possible future applications is as unlimited as our imagination.

The Internet is huge. As of June, 1991, it was estimated that the Internet is comprised of more than 5,000 networks connecting more than 350,000 computers. In fact, because it is in direct communication with satellites far above us, the Internet is already bigger than the earth.

The Internet is used by a large and diverse community of people. An estimated 3,500,000 people from many of the world's nations use the Internet, and this number is continuing to grow exponentially.

The Internet is also incredibly complex. There probably isn't a single person who understands everything about it. Remember this whenever you get confused, and you'll probably feel better!

But once you've mastered a few basic skills, the Internet is easy to use. Already, there are thousands of elementary school students in the world engaging in global communication through the Internet, and millions of other people from all walks of life who count on the Internet as an integral part of their day-to-day educational and research activities.

HOW TO USE NUSIRG

> *...a book is more than a verbal structure, or a series of verbal structures; a book is the dialogue with the reader, and the peculiar accent he gives to its voice, and the changing and durable images it leaves in his memory. That dialogue is infinite.*
>
> Jorge Luis Borges
> "For Bertrand Russell"

Use NUSIRG Either As A Book Or As Individual Documents

NUSIRG has been written so that it can be used either as a unified book, or as stand-alone chapters to teach you about specific Internet resources. Regardless of which way you use NUSIRG, each chapter will give you an indication of which other chapters of NUSIRG or other sources of Internet documentation will provide necessary background, or more detailed treatment of the topic at hand.

Customize Your Copy Of NUSIRG!

This document will be most effective if it is a continuing dialogue, between you, the Internet, and NorthWestNet User services.

NUSIRG is meant to be a document that you can easily customize to your particular level of expertise and sets of interests. It is hoped that everyone who uses this guide will get some of the many documents referenced at the end of every chapter, and put them in the appropriate locations in their own particular version of NUSIRG. This document will have succeeded in one of it's primary goals if there are as many versions of NUSIRG as there are NUSIRG users, just like everybody's glove compartment contains a different collection of road maps.

Most of the documents referenced can be obtained, for free, through a computer connected to the Internet. Getting free information is one of the easiest and most important networks skills you will learn.

NUSIRG has been written for anyone who uses the Internet: from kindergarten teachers at small and isolated rural schools, to the most sophisticated supercomputer users at major urban research institutions. Throughout, every attempt has been made to keep the text simple without being simplistic, and thorough without being thoroughly overwhelming.

MASTER ELECTRONIC MAIL, FTP AND TELNET; FROM THERE ON, EXPLORE!

Every Internet user is different, but nonetheless most network activities are based on three basic skills: using electronic mail, copying files from remote computers (FTP), and logging in to remote computers (TELNET). It is also a good idea to get an overview of the Internet as a whole. You should read through the chapters on the Internet, electronic mail, FTP, and TELNET first, unless this material is already old hat to you. Although the remainder of NUSIRG is designed in a somewhat incremental fashion, you should be able to bounce around between chapters without too much difficulty once you've mastered the basic "Internet-working" skills.

Most chapters have the following structure (where "x" is the topic of the chapter):

"What is x ?"
"What is x used for?"
"What do I need to know before I start using 'x'"
A general overview of x
A short example using x
A longer example using x with step-by-step explanations
"For more information on x...."

Because the Internet is able to support a tremendous diversity of hardware and software, it is sometimes impossible to present an example which is guaranteed to work for everyone. In such cases, a "generic example" is presented to illustrate the essential features of a particular Internet topic. When necessary, you should obtain appropriate documentation from your instructor or user services staff on how a particular application is used at your site. By the winter of 1991, you'll be able to access a collection of such documentation in the computer archives of the NorthWestNet Network Information Center, but this service is not yet available.

COMMUNICATE WITH NORTHWESTNET USER SERVICES

If you are a computer instructor or user services staff member, feel free to duplicate and distribute any or all parts of NUSIRG, for your students or clients, provided that appropriate attribution is given to both NWACC and NorthWestNet. The requirement for appropriate attribution will be satisfied by the inclusion of the inside cover/copyright page with every copy. If you make significant changes to the documents, indicate that your document is a modified version of NUSIRG. And, if you feel the changes you make result in notable improvements of the document, please send us a copy so the next edition of NUSIRG can be even better! All comments and suggestions from anyone using NUSIRG will be gladly taken, and, when possible, will be used to improve the next editions. At the end of the guide there is a "User's Feedback Form" which you are encouraged to fill out and return to NorthWestNet user services.

Welcome to the Internet - you are now a participating member of a global village!

Chapter 2: The Internet

> *Is it a fact ... that by means of electricity, the world of matter has become a great nerve, vibrating thousands of miles in a breathless point of time? Rather, the round globe is a vast head, a brain, an instinct with intelligence! Or, shall we say, it is itself a thought, nothing but thought, and no longer the substance which we deemed it!*
>
> Nathaniel Hawthorne, 1851

GENERAL INTRODUCTION

The Internet is a world-wide computer network which allows you to communicate with millions of other Internet users and to use the resources of computers throughout the world. No matter how humble your own computer might be, if it is connected to the Internet, you have a virtually unlimited wealth of resources available for your every day use.

To whet your appetite for "Internet-working," here's a partial list of the many ways you can use the Internet:

Communicating with other people:

❏ exchange electronic mail
❏ engage in online, real time discussion with other Internet users
❏ subscribe to discussion or subscription groups of people sharing your interests

Accessing the resources of other Internet computers:

❏ browse through electronic library catalogs
❏ copy computer files or software from archives
❏ access databases for teaching or research
❏ obtain free electronic books
❏ use educational and information services
❏ find Internet directory services
❏ access supercomputer sites

The details of how you can do all of this (and more!) is described in the rest of the chapters of NUSIRG.

This document is intended to give you a brief description of what the Internet is and how it works.

OVERVIEW OF THE INTERNET

What Is A Computer Network?

A computer network can be as simple as two computers in an office connected by a cable.

A simple computer network linking identical computers can be very useful in situations where all users are performing the same tasks, for example in a classroom or a business office. This kind of a setup allows files and mail to be transferred between the computers of the network, and may allow access to a centralized "hard disk" for sharing software, data files, and printers. But until the mid 1970's, it was difficult to link, or "internetwork," networks containing different kinds of computers.

What is An "Internet?"

Although simple computer networks are useful, a network which connects a variety of computers with distinctive features offers much more flexibility to its users. In such a network, you can use one kind of computer to rapidly perform complex calculations. When the first computer is done, you could use a network to send the output to a different computer more suited for easy preparation of colorful graphs.

But just like people can best communicate when they speak the same language, computers can best participate in a simple network when they use the same hardware and software to code, transmit, and receive data.

An "internet" is a more complex kind of computer network which allows computers with distinctive software and hardware to communicate by translating messages to a mutually understandable "communications protocol." The first real internet, ARPANET, arose from research supported by the Advanced Research Projects Agency (ARPA), now DARPA, Defense Advanced Research Projects Agency.

The standardized communications protocols which made the ARPANET possible evolved from the early NCP to today's "TCP/IP Protocol Suite."

TCP/IP makes certain that two computers reach an agreement about the basic rules of data exchange, and guarantees that messages are properly packaged and transmitted through the network. (References to detailed descriptions of the many activities of TCP/IP are listed at the end of this document). TCP/IP is one of the fundamental building blocks upon which standardized services can be built across diverse computers.

What Is The Internet?

- ❏ The Internet is a network of networks, all of which use the TCP/IP protocol suite as their standard communications protocols;
- ❏ The Internet interconnects supercomputers, mainframes, workstations, personal computers, and even laptop computers and packet radios;
- ❏ The Internet is huge; as of 1991 it comprises more than 5,000 networks, serving over 350,000 hosts and is used by more than 3.5 million people. These numbers will continue to grow every day!;
- ❏ Perhaps most importantly, the Internet is a global village of Internet users who can communicate across the planet as easily as you might walk to your next door neighbor's house.

Internet Addresses

Please read this section carefully. In order to communicate and navigate within the Internet global village, you have to know how to read and write Internet addresses. You need to specify an Internet address every time you send mail to an Internet user, or when you access Internet services like electronic library catalogs.

Internet addresses are very similar to postal mail addresses in form and function. For example, here's how someone from another country might address a letter to someone in the United States:

Jane Q. Public
11 Maple Street
Seattle,
Washington
USA

The address starts with a person's name. The next three lines provide increasingly general information about where she lives, from street to country. Since streets are in cities, cities are in states, and states are in countries, this can be described as a hierarchical addressing scheme.

Computers accessed by users of the Internet are "network hosts." Each network host has an "address," using the same sort of hierarchical addressing scheme as postal addresses, by which it is known to computers and users of the network. Most of the time, you will be able to use Internet addresses in the Domain Name System (DNS) format.

Suppose that Jane Q. Public has an account on an Internet computer at the University of Washington. (Her Internet address might look like the first line; her postal address is shown in the same format, on the second line, to illustrate the basic similarity between the two systems):

Internet:	jqpublic@ibmpc23.biology.washington.edu
US Mail:	JaneQPublic,11MapleStreet,Seattle,Washington,USA

The Internet address contains the following parts:

jqpublic	a "user-id" (User Identification)
@	"this user-id is located at"
ibmpc23	a particular Internet host within
biology	the biology department at the University of Washington campus network, within
washington	the Internet in Washington State, within
edu	the education-oriented portion of the Internet in the U.S.

While using the Internet, you may encounter or need to use another style of Internet address, which contains numbers instead of letters. This numeric addressing system is called the IP address and is in fact the addressing system by which computers are known to other computers (The Domain Name System is a convenience for us human beings, who are better at reading and remembering letters and words.)

For example, the hypothetical computer at the University of Washington which is called

ibmpc23.biology.washington.edu

in the Domain Name System might have the following IP numeric address:

128.95.10.207

Notice that this IP address has four parts, just like the Domain Name System address. Although it may be tempting to think that the four words separated by dots in the Domain Name System translate directly to the four numbers in the IP address, this is not the case. A more appropriate analogy is the way names are paired with phone numbers; they may be assigned and reassigned arbitrarily.

Domains and Hosts

The first part of an Internet address in DNS format always represents the name of an individual computer, or "host." The rest of the name represents "domains" and "subdomains," which are hierarchically arranged.

Consider the following three addresses:

nwnet.net	(host.domain)
stis.nsf.gov	(host.subdomain.domain)
nri.reston.va.us	(host.subdomain.subdomain.domain)

The last part of an Internet address in DNS format always represents a "top level" domain. Within the United States, here are some of the top level domains that have been assigned:

ARPA	Advanced Projects Research Agency
COM	Commercial organizations
EDU	Educational and research institutions
GOV	Government agencies
MIL	Military agencies
NET	Major network support centers domain
ORG	Other organizations
US	U.S. geographical domains (e.g., WA.U.S.)

The Internet As A Network Of Networks

The worldwide Internet is currently composed of more than 5000 component networks, all of which use the TCP/IP Protocols.

Many of the details of the organization and administration of the Internet within the United States could be drastically altered by pending legislation to establish a National Research and Education Network (NREN). Consequently, the information in this section is purposely fairly general. But at the very least, this section provides a broad-brush description of how the Internet in the United States is organized, as of the autumn of 1991.

How the Internet Is Structured Within The U.S.

Internet networks within the United States are organized hierarchically into national, regional, and various sorts of local networks. The purpose of each network is to provide Internet services to a particular geographic region or constituency.

National Networks Providers

National networks provide high-speed, long distance computer communication across the United States. At the present time, there are several distinct national level networks operated by various U.S. government agencies, not-for-profit organization, and commercial enterprises.

Although all of these networks span the nation, often have sites at the same locations, and all use the TCP/IP protocols, they are, for the most part, logically and administratively distinct entities that internetwork only through one or a few gateways.

The most prevalent national network for the Internet user at higher educational institutions is NSFNET, which serves as the backbone connecting most regional educational networks.

Here's a brief summary of some of the most widely used national networks in the Internet.

- NSFNET (National Science Foundation Network) was originally created to facilitate reliable communication between universities and to provide easy access to NSF-sponsored supercomputers. Its focus has now broadened to provide Internet connectivity to smaller colleges and post-secondary educational institutions.

- UUNET is a non-profit organization which provides electronic mail connectivity to more than 1,000 subscribing sites.

- ESnet (Energy Sciences Network) is operated by the Department of Energy, and is comprised of what were formerly HEPNET (High Energy Physics Network) and MFENET (Magnetic Fusion Energy Network), which connects physics departments conducting research in magnetic fusion energy.

- DDN (Defense Data Network) is funded by the Department of Defense, and itself contains a number of national level networks (ARPANET, DISNET, MILNET, SCINET, and WINCS) devoted to military communications.

- NSN (NASA Science Network) is for NASA staff, and research and academic sites performing NASA sponsored research who need access to a number of scientific databases and supercomputer sites.

- SPAN (Space Physics Analysis Network) is a data comparison network for researchers in Solar, Terrestrial, and Interplanetary Physics, but has since expanded to cover other disciplines. SPAN's primary services are for NASA (the National Aeronautics and Space Administration) and ESA (the European Space Agency).

- USAN (University Satellite Network) serves organizations doing research in the atmospheric and oceanographic sciences, featuring satellite access to the National Center for Atmospheric Research (NCAR) supercomputer facility.

Regional Internet Networks

Most regional Internet networks were created by funding from the National Science Foundation to provide networking services to universities and research institutions in specific geographic regions within the U.S.. Like the national Internet networks, most regional Internet networks have a Network Information Center and a Network Operations Center.

NSF-funded regional networks are connected to NSFNET at a "backbone site." For example, NorthWestNet (a regional network serving the northwestern U.S., including Alaska) is linked to NSFNET at the University of Washington in Seattle.

The existence of regional Internet-based networks is generally not perceivable to the average Internet user, much as the existence of regional phone companies is usually not apparent to you when you make a long distance phone call.

Many university Internet hosts are also beginning to act as local hubs to provide Internet access for primary and secondary schools.

Here is a list of some of the regional networks:

BARRNet:	"Bay Area Regional Research Network (San Francisco)"
CERFnet:	"California Education and Research Federation Network"
CICnet:	"Committee of Institutional Cooperation Network" Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin
JVNCNet:	"John von Neumann Center Network"; originally a supercomputer access network, now a regional serving the mid-Atlantic states
Los Nettos:	A regional network for the Los Angeles area
MIDnet:	A regional network for the Midwestern states Arkansas, Illinois, Iowa, Kansas, Missouri, Nebraska, Oklahoma
MRNet:	"Minnesota Regional Network"
NEARnet:	"New England Academic and Research Network" Connecticut, Maine, Massachusetts, New Hampshire Rhode Island, Vermont
NorthWestNet:	A regional network for the northwestern states Alaska, Idaho, Montana, North Dakota, Oregon, Washington
NYSERNet:	"New York State Educational and Research Network"
PREPnet:	"Pennsylvania Research and Economic Partnership Network"
Sesquinet:	"Texas Sesquicentennial Network"
SURAnet:	"Southeastern Universities Research Association Network"Alabama, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, North Carolina, South Carolina, Tennessee, Virginia, West Virginia
THEnet:	"Texas Higher Education Network"
WESTNET:	A regional network for the Rocky Mountain states Arizona, Colorado, Idaho, New Mexico, Utah, Wyoming

Internet Network NICs and NOCs

Most national and regional Internet networks have a NIC (Network Information Center) and a NOC (Network Operations Center).

A network's NIC provides centralized support for users and User Services staff throughout their network. Typical NIC activities can include: preparing, distributing, and maintaining documentation for network users, publication of newsletters; maintenance of a central computer archive of information files or other resources; and educational training classes for the users and network staff of member institutions.

A network's NOC deals with the operational aspects of running the network, including installation and maintenance of the network's hardware and software; daily monitoring and troubleshooting of the network's activity; and establishing connections to new network sites. NOC staff may also field questions from technical representatives from member institutions and from institutions which are contemplating connecting to the network.

Supercomputer Access Oriented Internet Networks

Finally, several Internet networks are dedicated to providing local access to the various NSF-sponsored supercomputer sites:

LANL:	Los Alamos National Laboratory Integrated Computing Network
NCSANet:	"National Center for Supercomputing Applications Network" Illinois, Indiana, Wisconsin
PSCNET:	Pittsburgh Supercomputing Center Network Pennsylvania, Maryland, Michigan, Oklahoma
SDSCnet:	San Diego Supercomputer Center Network

Statewide and Within-State Networks

Almost all 50 states currently have active statewide networks in place. Some of them use the TCP/IP protocols, thereby allowing attached computers to inter-communicate when connected to the Internet.

Metropolitan networks are a more recent entry to the network world. As the name suggests, these networks are designed to provide network services to geographically-restricted metropolitan regions.

NON-INTERNET NETWORKS

There are several very important national level computer networks in the United States which do not use the TCP/IP protocols, and thus, are not technically part of the Internet.

From an Internet user's perspective, a significant difficulty with non-Internet networks is that it is not possible, or at least very difficult, to perform remote logins to computers in such networks.

Nonetheless, you can communicate with users and computer on many non-Internet networks via e-mail messages sent to electronic mail "gateways." Gateways are responsible for translating messages created for transport across TCP/IP networks into messages that can be transported by the other networks.

Such gateways allow you to send mail to users on such non Internet networks, and in some cases allows you to access valuable services which are offered by these networks.

Corporation for Research and Educational Networking (CREN)

CREN is an umbrella organization which was responsible for two national networks, BITNET and CSNET. As of October 1991, CSNET was no longer operational. BITNET, however, is still a major provider of national educational networking.

BITNET--"Because It's Time Network"--was designed to facilitate electronic communications among universities throughout the world. BITNET is a strongly multi-disciplinary network with users in all academic fields. BITNET is of interest to Internet users because of a variety of unique and valuable services such as mature and widely used file and discussion list servers (such as LISTSERV). Like the Internet, BITNET has sister networks throughout the world which share network protocols (such as EARN, the European Academic and Research Network). The services of BITNET and its related networks are readily accessible to Internet users through gateways at several sites which are connected to both the Internet and to BITNET. For more information about electronic mail gateways, refer to Chapter 3 of NUSIRG.

FOR MORE INFORMATION ABOUT THE INTERNET

Although most information on the Internet is available as online documents, there are several notable printed books on The Internet specifically, and networking generally.

Published Books And Articles About Internet Networks

Frey, D. and R. Adams. 1990 !%@:: A Directory of Electronic Mail Addressing and Networks. O'Reilly and Associates, Sebastopol, CA.

LaQuey, T. L. 1989. "Networks for Academics," Academic Computing 4(3):32-39. Academic Computing Publications, Inc.., McKinney, TX.

LaQuey, T. L. 1990. User's Directory of Computer Networks. Digital Press, Bedford, MA.

Quarterman, J. S. 1989. "Etiquette and Ethics," ConneXions - The Interoperability Report 3(4):12-16. Advanced Computing Environments, Mountain View, CA.

Quarterman, J. S. 1990. The Matrix: Computer Networks and Conferencing Systems Worldwide. Digital Press, Bedford, MA.

Stoll, C. 1989. The Cuckoo's Egg: Tracking a Spy Through the Maze of Computer Espionage, Doubleday, New York, NY.

Published Information About Internet Protocols

Comer, D. E. 1991. Internetworking With TCP/IP. Volume 1: Principles, Protocols, and Architecture. Prentice Hall, Inc.., Englewood Cliffs, NJ.

Garcia-Luna-Aceves, J. J., M. K. Stahl, and C. A. Ward. 1989. Internet Protocol Handbook: The Domain Name System (DNS) Handbook. SRI International, Network Information Systems Center, Menlo Park, CA.

Stallings, W. 1990. Handbook of Computer-Communications Standards Volume 1: The Open System (OSI) Model and OSI-Related Standards; Volume 2: Local Area Network Standards; Volume 3: The TCP/IP Protocol Suite. Macmillan, New York, NY.

About "Online" Internet Information

The Internet is, to a large degree, self documented. There is an enormous amount of "online" information stored on computers throughout the Internet. A large percentage of such online information can be retrieved by using FTP (File Transfer Protocol), a tool for copying information to and from Internet computers. For detailed information on how to use FTP, refer to Chapter 4 of NUSIRG.

About Requests for Comments (RFC's)

RFC's are an essential source of information about the Internet. As of September 1991 there were more than 1,000 RFC's containing general information, technical specifications about the "nuts and bolts" of the Internet, and occasional general essays of interest to Internet users. Complete sets of RFC's are available in many "FTP archives"; one currently authoritative source of RFC's is:

FTP Host:	nnsc.nsf.net	
directory:	rfc	
files:	rfc-index.txt	(a current index of all RFC's)
	rfc1000.txt	(each RFC is named rfcXXXX, where "XXXX" is the RFC number, e.g., rfc1000)
	etc...	

Online Overviews About Internet Networks

Bowers, K., T. LaQuey, J. Reynolds, K. Roubicek, M. Stahl and A. Yuan. 1990 RFC 1175: FYI on Where to Start - A Bibliography of Internetworking Information.

FTP Host: nnsc.nsf.net
directory: rfc
file: rfc1175.txt

Spurgeon, C. 1990. Network Reading List. The University of Texas at Austin Computation Center, Austin, TX.

FTP Host:	emx.utexas.edu	
directory:	pub/netinfo/docs	
files:	network-reading-list.txt	(ASCII format)
	network-reading-list.ps	(PostScript format)

NSF Network Service Center. (ongoing). Internet Resource Guide. NSF Network Service Center, Cambridge, MA

FTP Host: nnsc.nsf.net
directory: resource-guide

file: README (copy this file with FTP for instructions on the options you have for FTP'ing or subscribing to the NNSC Internet Resource Guide)

Online Information About Internet Protocols

Hedrick, C. L. 1987. Introduction to the Internet Protocols. Rutgers University Computer Science Facilities Group, Piscataway, NJ.

FTP Host: topaz.rutgers.edu
directory: pub/tcp-ip-docs
files: tcp-ip-intro.1
tcp-ip-intro.2

Hedrick, C. L. 1988. Introduction to Administration of an Internet-based Local Network. Rutgers University Computer Science Facilities Group, Piscataway, NJ.

FTP Host: athos.rutgers.edu
directory: runet
files: tcp-ip-admin.doc (ASCII format)
tcp-ip-admin.ps (PostScript format)

Krol, E. 1989. RFC1118: "The Hitchhiker's Guide to the Internet. University of Illinois Urbana, Urbana-Champaign, IL

FTP Host: nnsc.nsf.net
directory: rfc
file: rfc1118.txt

Oganizations And Periodic Conferences Relevant to Internet Users

ACM SIGCOMM Symposium

The Association for Computing Machinery
11 West 42nd Street
New York, NY 10036-8097

phone: (212) 869-7440
fax: (212) 869-0481.

IDG Communication Networks Conference & Exposition

IDG Conference Management Group
P.O. Box 9171
Framingham, MA 01701

phone (800) 225-4698
(508) 879-6700
fax: (508) 872-8237

Internet Engineering Task Force (IETF)

Corporation for National Research Initiatives
1895 Preston White Drive
Suite 100
Reston, VA 22091

Attn: IAB Secretariat

e-mail: ietf-request@venera.isi.edu.

Internet Society

1895 Preston White Drive
Suite 100
Reston, VA 22091

e-mail: isoc@nri.reston.va.us

INTEROP Conference and TCP/IP OSI/ISO ISDN Internetworking Tutorials

Interop, Inc..
480 San Antonio Road
Suite 100
Mountain View, CA 94040

phone: (415) 941-3399 or
(800) INTEROP
fax: (415) 949-1779.

National Net Conference, and EDUCOM Conference.

EDUCOM
1112 16th Street, NW
Suite 600
Washington, DC 20036

phone: (202) 872-4200.

NREN

By time you read this, NSFNET and similar national Internet networks may have been renamed "The National Research and Education Network" (NREN). In November of 1991, President Bush signed the High-Performance Computing Act which authorized the creation of a permanent NREN. The bill allocated $2.9 billion over the next five years to enhance the United States' high-performance computing and communications infrastructure.

Information on the NREN is available electronically from:

FTP Host:	nis.nsf.net
directory:	nsfnet
files:	all files

There are also online discussion groups dealing with NREN related issues:

Group Name	To Subscribe
nren-discuss@psi.com	e-mail to nren-discuss-request@psi.com
com-priv@uu.psi.com	e-mail to com-priv-request@uu.psi.com

SECTION 2: THE BASIC TOOLS

ELECTRONIC MAIL, FTP, AND TELNET

Section 2 of NUSIRG introduces you to the three basic tools for using the Internet. Once you've mastered Electronic Mail, FTP, and TELNET, you will be able to take advantage of most all Internet services.

ELECTRONIC MAIL (E-MAIL)

Electronic Mail is used to send messages to other people and even programs on other computers. You'll learn the basic principles of using e-mail within the Internet, and "e-mail etiquette" which apply to all forms of electronic communication with other people. At the end of this sub-section, you'll learn how to use "mail gateways" to send e-mail messages to users and computers which are not part of the Internet networks.

FTP

The File Transfer Protocol (FTP) is for copying information from one computer to another. By knowing how to use FTP, you will be able to access free information from computers throughout the world. As you will notice, many of the documents to which you are referred for more information throughout NUSIRG are from FTP archives, so you'll have many opportunities to practice your FTP skills! This sub-section also includes information on how to handle archived, compressed, and binary files, which require special attention during or after an FTP transfer.

TELNET

TELNET allows you to actually login to and use many computers on the Internet. A modified version of TELNET called "tn3270" is often used for accessing Internet services on IBM mainframes. You'll be shown how to use TELNET to access many valuable Internet applications throughout the rest of NUSIRG, including electronic library catalogs, online databases and Internet directory services. As examples of TELNET services, you'll learn how to use a typical online Information Service, and the "Archie" program, which is designed to search through hundreds of FTP archive catalogs around the world.

Chapter 3: Electronic Mail

He opened the geography to study the lesson...they were all different places, that had those different names. They were all in different countries...and the countries were in continents, and the continents were in the world, and the world was in the universe. He turned to the flyleaf of the geography, and read what he had written there:

Stephen Daedelus
Class of Elements
Clongowes Wood College
Sallins
County Kildare
Ireland
Europe
The Universe

James Joyce
Portrait of the Artist as a Young Man (pg. 15)

GETTING STARTED WITH ELECTRONIC MAIL

What Is Electronic Mail?

In most ways, electronic mail (or "e-mail") is very much like regular, postal mail. It is used to send letters or other information to other people.

Instead of being delivered by the postal service to a person's house or business, e-mail is sent through a computer network to a person's computer.

What Can You Do With Electronic Mail?

You can use e-mail for most of the same purposes for which you can use postal mail (except for mailing physical objects).

Even better, an e-mail message usually gets to its destination in minutes or even seconds, rather than in days!

You can also use e-mail to communicate with special computers called "mail servers," which automatically respond to certain commands, and can send you information or files back by e-mail. This document includes an example of using a mail server so you can get some experience using e-mail on the Internet.

What Do You Need To Know To Use Electronic Mail?

Because you probably already know how to write and send letters, you can understand e-mail by thinking about its similarities to regular US postal mail.

Suppose you wanted to write a letter to your aunt Susan Rose Allen to ask if you could stay at her farm the second week of July. All you'd have to do would be to:

1. write your letter;
2. put her name and address on an envelope;
3. and put your letter in a mailbox (Example 1).

Using e-mail is just as simple, and involves exactly the same three steps:

1. write your e-mail message on a computer;
2. include the person's user-id and e-mail address;
3. and then send your e-mail message!

Example 1: A typical US mail letter:

James T. Allen
12345 NE 47th Ave.
Seattle, Washington (1)
June 1, 1991

Susan Rose Allen
Idaho Creek High School
12 Apple Tree Lane
Idaho Creek, Idaho

Dear Aunt Susan,
Do you think I could visit you the second week of July? I promise to help you pick cherries from your orchard! Well, I'd better stop writing, the mail truck is coming by in a few minutes. Please write back soon!

James

Example 2: A typical e-mail message:

Date: Mon., 6 June 91 14:22 PST
From: jt_allen@jrhs.lkside.wash.edu
To: sr_allen@hs.idacrk.idaho.edu
Subject My first e-mail message!

Dear Aunt Susan,

Thanks for letting me know I could visit starting July 15th. When I'm there, do you think your friend the geology teacher, Bill Diaz, could take me prospecting again in the mountains? I really enjoyed riding pack horses into the canyon last summer!

Please send me a computer message back soon...This is my *first* time using e-mail and I want to be sure this gets to you. I can't believe that I can use this computer to write a message to you in Idaho!

- James

1. Everybody Using The Internet Has A "User-id"

Before you mail a regular letter, the first thing you should know is to whom it will be sent. Usually, you'll put that person's regular name on the envelope.

If you want to send e-mail to someone, you have to know their user-id. The term "user-id" is an abbreviation for USER-IDentification, and is generally pronounced "user eye dee". User-ids are often assigned by computer network authorities at a person's school or workplace.

Let's look at the beginning of the second and third lines of the simple e-mail message (Example 2):

From: jt_allen
To: sr_allen

The first line indicates that the message is from user-id "jt_allen" (James Trevor Allen) and that the message is going to user-id "sr_allen" (Susan Rose Allen).

In this example, the user-id's are made in a very easy-to-understand way that you'll probably see very frequently. Both of these user-id's were made by putting together a person's first and second initials, an underline, and then the first five letters of their last name.

But don't forget, there are many other ways to construct user-ids!

Here are some other ways Susan Allen's name might be turned into a user-id at other Internet sites:

ALLSUSR	(ALLen, SUSan, Rose)
ALLENSR	(ALLEN, Susan, Rose)
SUSRALL	(SUSan, Rose, ALLen)
NRG1234T	(a completely arbitrary user-id assigned to Susan)

So just because you know someone's regular name doesn't mean you can guess their user-id. You usually need to know a person's user-id before you can try to send them e-mail. Later in this user's guide, you'll learn how to find a person's user-id if you already know their real name, but there are a few other things that we need to cover first.

If you're looking at Example 2 right now, you're probably wondering what the rest of the lines 2 and 3 are all about.

What in the world does "sr_allen@hs.idacrk.idaho.edu" mean?

It means where (at what computer) in the Internet world Susan Rose Allen, with user-id sr_allen, has a computer account.

2. Every User-id Is At ("@") A Computer Address

Once you know a person's name, the next thing you have to know if you want to write them a regular letter is their regular mail address.

The same is true for e-mail: you need to know that person's e-mail address. Luckily, Internet addresses are put together in almost the same way as regular mail addresses.

Look at Susan Allen's regular mail address in the US mail letter in Example 1. After her name, there are four parts to her address. This address starts with the most local information (her school) and ends with the most general (her state).

This standard way of writing an address helps the postal service find the right person in the right town in the right state. After all, there might be 2 different Susan Allens in Idaho Creek, 20 different Susan Allens in Idaho, and 2,000 different Susan Allens in the United States!

Computer addresses (or domain names) usually follow the same rules as postal addresses for the same reasons. Here are some important facts about Internet domain names:

- ☐ You read a computer's Internet domain name left to right; the first name is usually the name of a particular computer, and the last name is the abbreviation for a national or international computer domain (e.g., "edu" for the EDUcational part of the U.S. portion of the Internet, "au" for the Australian portion of the Internet, etc..).
- ☐ Each part of a computer's domain name is separated by a period, instead of being on a new line.
- ☐ E-mail addresses use many abbreviations.
- ☐ The particular words in each part of a domain name may have meaning, only to site administrators. Each site is responsible for choosing their own domain name, and the may as easily choose to name their computers after a cartoon character or a famous author as after a geographical location.

For more information about Internet domain names, see "Internet Addresses" in Chapter 2.

Well, now, let's put Susan's postal and e-mail address into the same format and compare them:

e-mail:	hs.idacrk.idaho.edu
US Mail	HighSchool.IdahoCreek.Idaho.USA

How Do You Use E-mail?

There are many kinds of e-mail software programs, each with different special features--so it's impossible to include instructions for every kind of e-mail software in this document. These instructions would be about 100 pages longer, and would contain a great deal of information that you--and many other people--wouldn't need!

Hopefully, your instructor or your computer center staff can help get you started with the particular e-mail software used by your computers. But no matter what mail software you use, you will usually go through a few simple steps when you send e-mail.

The Basic Steps For Sending E-mail

Step 1. You start a mail software package by typing it's name (or on computers like the Macintosh, clicking on an icon). Mail packages are often called something like "mail" or a name containing the word "mail."

Step 2. You will usually be asked to supply one or more user-ids and e-mail addresses as your list of recipients.

Step 3. Very often you will be asked to supply a "subject," which should be a brief description of what the letter is about. Many mail software packages offer additional useful features for the "envelope" of the electronic letter, such as "cc:" for the sending of "carbon copies."

Step 4. To draft your letter, you will usually then be able to use a mail editor, which is similar to a simple word processing program.

Step 5. When you are done typing your message, you can send your e-mail message!

Receiving Incoming Mail E-mail

Usually the same mail software which allows you to write and send mail is also used for receiving and for displaying your mail.

Incoming mail is usually stored in an electronic "mailbox" or "mailbook" which allows you to scan the subjects and user-ids of mail that has been sent to you, just like you might riffle through a pile of mail that has arrived at your house.

You can read the mail with the mail editor, and send a reply back to the user-id and e-mail address in the line labelled "from."

Retrieving Files via E-Mail from Electronic Mail Servers

E-mail can also be used to send messages to computers on the network which will automatically send back information that you have requested. Such computers are sometimes called "mail servers."

Electronic mail servers (sometimes referred to as "file servers") are programs which accept a few special commands to retrieve files from "file archives."

To use an electronic mail server, send an e-mail message to the mail server's Internet address, and put requests to the mail server in the body of your mail message. Sometimes, but not always, mail server commands can be placed in the "subject:" line as well.

To get started with a mail server, you should try sending e-mail with the word "help" in the message. Often, within a short time (usually minutes, but sometimes as long as a day) you should receive a message in your incoming mail with a description of how to use that particular mail server, and sometimes, detailed descriptions of what files that particular mail server contains.

There are many mail servers located throughout the Internet. Here's a brief list of some mail servers containing files of general interest:

E-Mail Address	Partial Description of Contents
almanac@oes.orst.edu	Agricultural information, Electronic Books
archive-server@ames.arc.nasa.gov	NASA and space related files
mail-server@pit-manager.mit.edu	Many files useful for new Internet users, such as "FAQ" files (Frequently Asked Questions), as well as a large number of archives of USENET newsgroups
netlib@research.att.com	Mathematical source code and algorithms.
netlib@uunet.uu.net	A large collection of files on many different topics: source code for most kinds of personal computers, archives of USENET newsgroups.
service@nic.ddn.mil	Internet information files including RFCs and FYIs

For example, you can send mail to a computer service run by the Oregon Extension Service called "Almanac" which contains a wide variety of educationally valuable offerings such as "electronic books," and an enormous amount of information from the Department of Agriculture which you can have sent to you simply by sending e-mail.

In this example, you'll send a message to Almanac, requesting a copy of the Declaration of Independence!

Step 1. Start your mail program

Step 2. Address a mail message to the following Internet user-id and address:

```
almanac@oes.orst.edu
```

Step 3. You don't have to include anything in the subject line

Step 4. In your mail editor, type the following message:

```
send guten dec-of-ind
```

"Guten" is short for "Project Gutenberg", a non-profit organization dedicated to creating free electronic versions of the world's great literature and "dec-of-ind" is the file name for the Declaration of Independence.

Step 5. Send the mail message.

Step 6. In a short while, you should receive e-mail from Almanac. If you did everything right, it will be a copy of the Declaration of Independence! If you made a mistake, the e-mail message from Almanac will give you a hint about what you did wrong, and how to send a correct request.

If you want more information about Almanac, you can send an e-mail message to Almanac containing one of the following messages:

send guide (to get a copy of the Almanac Guide) send topic catalog (to get a copy of Almanac's holdings).

For More Information About Electronic Mail

For more information about specific electronic mail software, consult your local users service staff or your instructor. If you are using a mainframe computer, you may also be able to get help by typing "man mail" (on UNIX computers), or "help mail" (on most other mainframes).

Many of the technical details about how e-mail is packaged and handled on the Internet are specified in the following "RFCs" (Requests for Comments):

RFC822 Crocker, D.H. Standard for the Format of ARPA Internet Text Messages
RFC821 Postel, J.B. Simple Mail Transfer Protocol
RFC974 Partridge, C. Mail Routing and The Domain System

These and all other RFCs can be obtained from a number of FTP archives around the world. One currently authoritative FTP archive for RFCs is:

FTP Host:	nnsc.nsf.net	
directory:	rfc	
files:	rfc-index.txt	a current index of all RFCs
	rfc1000.txt	each RFC is named rfcXXXX, where "XXXX" is the RFC number, e.g., rfc822
	etc...	

For more information about using FTP (File Transfer Protocol), refer to chapter 4 of NUSIRG.

For More Information About Electronic Mail Servers

Jonathan Kamens of MIT maintains a file called "How To Find Sources" which contains a listing of useful electronic mail servers (along with many other useful sources of information). Rather appropriately, this file is itself available from a mail server.

To get this file, address an e-mail message to:

mail-server@pit-manager.mit.edu

containing the following message, all on one line, with every character entered EXACTLY as shown:

send usenet/comp.sources.wanted/How_to_find_sources_(READ_THIS_BEFORE_POSTING)

ELECTRONIC MAIL ETIQUETTE

> *Undirected by culture patterns--organized systems of significant symbols--man's behavior would be virtually ungovernable, a mere chaos of pointless acts and exploding emotions, his experience virtually shapeless. Culture, the accumulated totality of such patterns, is not just an ornament of human existence but ... an essential condition for it.*
>
> Clifford Geertz
> *The Interpretation of Cultures* (pg. 46)

> *More often than not, what brings a stranger to his knees here is waving. Waving--it looks like a simple act, but it's almost as complicated as spoken Minnesotan.*
>
> Howard Mohr
> *How To Talk Minnesotan* (pg.182)

There are a number of important and generally agreed upon do's and don'ts which you should at least consider when you use e-mail.

Of course, as with all kinds of etiquette, there are no absolute right and wrongs, only modes of behavior which are deemed acceptable by the community of people with whom you are communicating. Therefore, these should be treated as suggestions, rather than inviolable rules.

This list may seem long and somewhat arbitrary, but after reading many mail messages from many other people (and examples 1 and 2, which, respectively, follow and violate these suggestions), you will probably understand why these principles make good sense.

Etiquette and E-mail style

Here is a list of some simple guidelines or suggestions for using electronic mail acceptably:

- ☐ Be brief. You can often fit everything you need to communicate in one screen of text.
- ☐ Try to keep the length of the lines in your e-mail below 65 columns; short lines are easier to read, especially on a computer screen, and other people's terminals may not be able to display more than 70 columns, so they may not be able to read the ends of long lines.
- ☐ Use blank space between paragraphs or other logical units of text to break the text up for the eye.
- ☐ Use mixed upper and lower case and standard capitalization. Mixed-case text is much easier to read than all lower or all upper case; even worse, USING UPPER CASE WHEN YOU WRITE IS LIKE SCREAMING WHEN YOU SPEAK!
- ☐ Most computer terminals do not display underlined or italicized characters, which are commonly used to provide emphasis in handwriting. So, if you want to emphasize something, you can use all-capital letters for what you REALLY want to emphasize. Another way to emphasize a word is to put asterisks,

underlines, or other special characters at the beginning and end of a word or phrase, like *this*, or like _this_, or >even< like that!

☐ Keep your paragraphs short; in general, fewer than 15 lines should be about right. (Notice how much easier it is to read this paragraph than the one above.)

☐ Avoid using control sequences (like "ctrl z") or special keys (like tab bars), even if they seem to work fine while you are editing your mail document. Such special characters may alter the display of your message making it virtually unreadable on the other person's computer terminal.

Etiquette and E-mail content

☐ Begin your text with the name of the person to whom you are writing, just like you'd begin a regular letter. Even though the person's name is in the mail header, starting your text with their name makes your message seem more personal.

☐ If you are responding to someone else's mail, you might want to include short, relevant passages from the original message. This will be useful to establish context, or give your e-mail more of a conversational tone. The standard convention used in the Internet community is to:

> begin each line from their message with a "greater than" sign, like this.

Some mail software allows you to automatically include someone else's mail message in your outgoing message. You are then free to edit out the lines you don't want to include. Be careful *not* include their entire message unless you have to! This wastes resources used for transmitting and storing mail, and may waste the time of the person to whom you are writing.

☐ Never forget that the person to whom you are sending mailing is another human being, with feelings and beliefs that may be very different from yours! This can be easy to forget when you are sitting at a computer terminal, writing a mail message to a person you might never have met in real life, and about whom you may know very little.

☐ In face-to-face conversation, there are many subtle cues provided by body language and intonation that let us know how what we are saying is affecting the other person. These cues are completely absent when using e-mail, so strive to be concise, clear, and polite in your own writing, and flexible in your interpretation of other people's mail. This follows an old networking axiom: "be precise in what you send, and forgiving of what you receive."

☐ Since e-mail doesn't contain physical cues, a number of conventions peculiar to e-mail have been developed. In particular, a "smiley" is used to indicate that the previous statement that is meant in a light-hearted or humorous way. "Smileys", when looked at sideways, look vaguely like "stick drawings" of human faces. There are hundreds of smileys that can be made with the basic characters of a keyboard, each of which conveys a slightly different meaning. Here is a small audience of smileys to give you an idea:

:-) the basic smiley

;-) the winking smiley

;^} a slightly more sinister winking smiley

:-\ a consternated smiley

☐ End the text of your message with your name. Again, this makes your mail feel more personal to the reader.

☐ With some mail software, you can easily create a file called a "signature" (or "sig") which is automatically added to every outgoing mail message you send. If you *do* use a sig

- Keep your sig short, fewer than five lines is enough.
- Don't include a lot of graphics made of letters and characters, lists of all possible telephone numbers, postal, and e-mail addresses at which you can be contacted, or your favorite quotes.

At the very least, such sigs can be annoying, and at worst, they take up space in other people's computers.

❏ And finally, before sending off your e-mail message:

- Look over what you have written.
- Make sure you've said everything you needed to say.
- Make sure you haven't said things you didn't need to say.
- Make sure you've used correct spelling and grammar. splling errers end bad grammers make it harder for uther peeple to reed what you wrought.:^)

Etiquette and the Sending of E-mail

Many mail software packages allow you to add a person's real name to the "TO:" field. This adds a humanizing touch to your mail messages. Most people prefer to be called by their real names, rather than some arbitrary user-id!

Use short, informative, subject lines. You can usually summarize what your message is about in fewer than 40 characters; and in many cases, software for receiving e-mail only displays the first 15 or 20 characters!

Most mail software packages have a "CC:" (Carbon Copy) option. This will cause your mail to be sent to additional people who are at least marginally interested in what you have sent to the person indicated in the "TO:" field. For example, in the correspondence between Bill Diaz and James Allen in the Introduction to Mail section of this User's Guide, Bill and James might "CC:" Susan Allen on many of their messages. This is a very sensible thing to do since Susan will want to know how Bill and James' plans would affect the timing and activities of James' visit to Idaho Creek.

In Summary:

The following page summarizes all of these points of e-mail etiquette.

The page after the e-mail etiquette summary gives examples of these do's and don'ts in action:

- ❏ Example 1 illustrates the intelligent and tasteful use of these rules of etiquette and style. See how much more pleasant and easy to read it is than Example 2, which violates every rule that has been suggested.
- ❏ Example 2 may seem extreme, but as everyone who has used the Internet can attest, such examples*do* occur! Such an e-mail message is an embarrassment for the person sending it, and an annoyance to the person(s) receiving it.

The Basic Principles of E-mail Etiquette

Be brief.

Keep line lengths to less than 65 columns.

Use blank spaces between paragraphs to help the reader's eye.

Use mixed upper and lower case.

Use capitals AND special characters for *emphasis*!

Keep your paragraphs short. Fewer than 15 lines is best.

Avoid control characters or special keys.

Begin text with the real name of the person you're writing.

If useful, include parts of mail to which you are replying.

End the text of your message with your real name.

If you use a "sig", keep it short and simple.

Review what you've written BEFORE you send it.

Include the person's real name in the "TO:" line of the header.

Use the "CC:" option if available and if appropriate.

Example 1: E-Mail Following Suggested Etiquette Guidelines

```
Date: Wed. 8 June 91 10:45 MST
From: Bill Diaz <wt_diaz@hs.idacrk.idaho.edu>
To:   Jim Allen <jt_allen@jrhs.lkside.wash.edu>
CC:   Susan Allen <sr_allen@hs.idacrk.idaho.edu>
Subject:    Prospecting in Ponderosa Canyon

Jim,

I'm *delighted* to hear you're visiting this summer! In your last letter to
Susan, you wrote:

> When I'm there, do you think that geology teacher Bill Diaz
> could take me prospecting again in the mountains?

Well, absolutely! I'd be glad to have you come along!  I've planned a trip
from July 24-27, if that fits with your plans.  Here's some things to get
ahold of before you visit:

      a geological hammer
      a good field guide for rocks and minerals
      a *light* sleeping bag (remember how HOT
      you were in that down bag last summer? :-)
      a sturdy pair of hiking boots
      a pair of plastic sunglasses


If you need advice on what to get, feel free to contact me!  Take care,

Bill

49 Pear Tree Lane
Idaho Creek
Idaho
```

Example 2: E-Mail Violating Suggested Etiquette Guidelines

```
Date:    Wed. 8 June 91 10:45 MST
From:    wt_diaz@hs.idacrk.idaho.edu
To:      jt_allen@jrhs.lkside.wash.edu
I'm delEted to hear that you're visiting us in Idaho Creek again th
r!  I'd be happy to have you come pospecting.  I've already planned
 a m July 24-27. Here's some things you should prbably bring along:
^Z logical hammer, a g   od field guide f     rocks and minerals, a
     light sleep if    king boots, and     sunglasses with plastic
    boots would be    Free to MAil ba     ser-id. Here's my sig!/-
^  ^           /  \    /\       /\  \  |  /  /'tis a gift to be sim
    ^ _       /----\  /  \     /  \  \ | /  /'tis a gift to be free
     / \     / /\/\ \/----\   /----\  \ /  /+-------------------
    /   \   /"home is\       /      \  O  /    |__   o    |    |
   /     \ / where the\              \   /     |  \  |
  /       \heart is"   \                       |__/ _|_  _|_  _|_
tel: (208) 999-1234 (home) 999-4321 (woodshed) 999-3456 (car fax)
user-ids:  dt_diaz@hs.idacrk.idaho.edu (INTERNET) dt_diaz@idacrkh
```

For More Information About E-Mail Etiquette

Most of the principles discussed in this chapter are derived from the following sources:

Published Articles

Quarterman, J. S. 1989. "Etiquette and Ethics", ConneXions--The Interoperability Report 3(4):12-16. Advanced Computing Environments, Mountain View, CA.

Online Information

The following articles are "periodic postings" which appear in the USENET newsgroup "news.announce.newusers". Although they are aimed specifically at USENET users, many of the principles they espouse are relevant to all electronic mail communication. For more information on how to use USENET, see Chapter x of NUSIRG, "Using USENET."

Offutt, A.J., and G. Spafford 1991. "Hints on Writing Style for USENET."

Templeton, B., and G. Spafford. 1991. "Emily Postnews Answers Your Questions on Netiquette." (A tongue-in-cheek, very funny, but very informative essay on what not to do in electronic mail, especially in USENET postings).

Von Rospach, C. and G. Spafford. 1991. "A Primer on How to Work With the USENET Community."

ELECTRONIC MAIL GATEWAYS: SENDING MAIL BEYOND THE INTERNET

What Are Electronic Mail Gateways?

Mail gateways are computers which allow mail and other messages to be transmitted between networks which use different methods of addressing and packaging information.

Why Are Gateways Necessary?

Many computer networks are not part of the Internet, and do not use the Internet Protocols (IP). Recall that if you want to send an e-mail message anywhere in the Internet you would use the standard IP address format:

user-id@an.Internet.host.address

But many networks use very different formats for their addresses. As an extreme, here's an example of an address in SprintMail, which is not an Internet network:

[user/organization]system/country

Internet mailers cannot read this address, because it contains information and symbols which are not part of an Internet address. (Much like your postman might have trouble delivering a letter with an Internet address!) Furthermore, the actual way in which mail messages are packaged in other networks may be considerably different.

Mail gateways are able to resolve differences in both addressing and packaging when transmitting information between networks.

How Do You Use Electronic Mail Gateways?

You need to know four things to send mail to users and computers on other networks:

- ☐ The addressing convention of the network to which you are sending mail;
- ☐ How to "package" the address information for the other network in a way that it will not be inadvertently modified on its way to the intended destination;
- ☐ The address of the appropriate gateway computer, and, of course,
- ☐ The address information of the person or computer on the other network.

All of the information you need to answer questions 1-3 for many of the more commonly used non-Internet networks is provided in Table 1.

The basic strategy used by mail gateways from the Internet to other networks is to put the other network's addressing information in the "user-id" field of the Internet DNS address. It is also necessary to provide the Internet address of the appropriate e-mail gateway.

For example, suppose you want to send an e-mail message to a user who has an account on a BITNET host. The typical user-id and e-mail address within the BITNET network looks like this:

bituser@bithost

To send an e-mail message to our friend "bituser" from a computer in the Internet, we need to include their user-id, their particular BITNET host's name, and the Internet address of an Internet-BITNET gateway (gateways between the Internet and BITNET are often referred to as "Interbit" gateways)

Here's a general example of how this would be done:

1. Their BITNET address

   bituser@bithost

2. The address required for forwarding by an Interbit gateway:

   bituser%bithost.bitnet@An.Interbit.Gateway.Address

where "An.Interbit.Gateway.Address" is one of the several computers which are connected to both the Internet and to BITNET, and whose administrators have agreed to provide Interbit gateway services..

How to Use the Mail Gateways Table

As the previous example demonstrates, you need to know the Internet addresses of gateways which are appropriate for sending e-mail to users on non-Internet networks. The "Table of Mail Gateways from Internet to Other Networks" (below) provides this information for some of the many networks to which Internet users frequently send e-mail.

In order to learn how to use this table, work through this example.

Suppose you wanted to send an e-mail message to a friend who has an account on the FidoNet network. They've told you that their FidoNet addressing information is:

Kelley Meithisson at 3:56/67

Look in the first column to find Fidonet. Read across to the line labelled "1)." This shows a typical FidoNet userid and address, which corresponds to your friend Kelley's address information above. Now look at the next line, labelled "2.". This shows how Kelley's FidoNet address should be translated by an Internet user so that an e-mail message will be successfully sent to a FidoNet user. According to line 2, Kelley's FidoNet address should be translated to:

Kelley.Meithisson@f67.n56.z3.fidonet.org

This address is now acceptable to mailers which conform to the Internet standards, and once it arrives at the Internet--Fidonet gateway, it will be translated to a FidoNet address format and delivered within the FidoNet network to Kelley.

Table Of Mail Gateways From Internet to Other Networks

Network	1) addressing syntax within the other network 2) addressing syntax for mail sent from Internet
Applelink	1) user-id 2) user-id@applelink.apple.com
BITNET	1) user-id@site 2) user-id@site.bitnet OR user-id%site.bitnet@An.Interbit.Gateway.Address Notes: At many Internet sites, you can address mail to BITNET users with the simple "user-id@site.bitnet". If this doesn't work, try the following syntax to use one of the Internet--BITNET gateways: user-id%site.bitnet@An.Interbit.Gateway.Address where "An.Interbit.Gateway.Address" is anyone of the following: CORNELLC.CIT.CORNELL.EDU Cornell University CUNYVM.CUNY.EDU City Univ. of New York MITVMA.MIT.EDU M.I.T.
CompuServe	1) 7xxxx,yyy 2) 7xxxx.yyy@compuserve.com
EASYnet/ DECnet	1) user-id@host 2) user-id@host.enet.dec.com
ESnet	1) user-id@host 2) user-id@lbl.dnet.nasa.gov
FidoNet	1) Firstname Lastname at 1:2/3 2) Firstname.Lastname@f3.n2.z1.fidonet.org
JANET	1) user-id@A.Janet.Domain.Address 2) user-id%A.Janet.Domain.Address@nsfnet-relay.ac.uk
MCI	1) FirstName LastName (123-4567), where 123-4567 is an MCI phone id # 2) 123-4567@mcimail.com
PSInet	1) user-id@host 2) user-id%host@uu.psi.com
Sinet	1) node::user-id

2) user-id@node.sinet.slb.com

or

1) node1::node::user-id
2) user-id%node@node1.sinet.slb.com

SPAN 1) user-id@host
2) user-id@host.span.nasa.gov

THEnet 1) user-id::host
2) user-id@node.decnet@relay.the.net

UUNET 1) user-id@site
2) user-id%site@uunet.uu.net

VNET 1) user-id@host
2) user-id@vnetsite.ibm.com

For More Information on Electronic Mail Gateways

A good online source of information about gateways from the Internet to other networks is:

"The Inter-Network Mail Guide," by John Chew, which is available from the following FTP archive:

FTP Host: ra.msstate.edu
directory: ftp/pub/docs
file: internetwork-mail-guide

(For information on how to use FTP, see chapter 4 of NUSIRG.)

Chew's document is also posted periodically to the following USENET discussion groups:

comp.mail.misc
new.newusers.questions

(Please see Chapter 7 of NUSIRG for more information on using USENET.) and is available from the following LISTSERV list:

mail: listserv%unmvm.bitnet@cunyvm.cuny.edu
subject: (none necessary)
message: get network guide

For information on how to use LISTSERV, see Chapter 8 of NUSIRG.

Printed Books On Gateways

The following three reference books are invaluable resources for understanding the intricacies of electronic mail gateways, specifically, and intercommunication between networks generally:

Frey, D., and R. Adams. 1989. "!%@:: A Guide to Electronic Mail Networks and Addressing. " O'Reilly and Associates, 981 Chestnut Street, Netwon, MA.

LaQuey, T.L. 1989. "User's Directory of Computer Networks." Digital Press, Bedford, MA.

Quarterman, J. S. 1990. " The Matrix: Computer Networks and Conferencing Systems Worldwide". Digital Press, Bedford, MA.

Chapter 4: Using FTP

WHAT IS FTP?

FTP means "File Transfer Protocol." The purpose of FTP is to allow quick and easy transfer of files between computers connected to the Internet.

There are two kinds of FTP access: "anonymous FTP," and what we'll refer to as "full service FTP." We'll start by explaining how to use anonymous FTP.

ANONYMOUS FTP AND FTP ARCHIVES

"Anonymous FTP" allows anyone on the Internet to access computers which contain "file archives." File archives on hundreds of anonymous FTP hosts throughout the world contain:

❏ text files (such as this document),
❏ computer software for personal computers and mainframes,
❏ computer graphics,
❏ archives of scientific, sociological, historical or other sorts of data,
❏ archives of on-line discussion groups, and
❏ and any other kind of information that can be stored in a computer.

"Anonymous FTP hosts" are accessible to all Internet users who have FTP installed on their computers.

HOW INFORMATION IS ARRANGED IN FTP HOSTS

If you're not familiar with the concept of directories, please read this section before continuing.

The information in most FTP hosts is arranged in a hierarchical file system. a branching system usually diagrammed as an upside-down tree.

The "root" of this tree is the "root FTP directory," which is where you start when you enter an FTP host. You can think of the subdirectories as branches, and files as the tips of branches.

Here's a diagram of the part of the directory structure of the FTP host, ftphost.nwnet.net, which leads to the directories and files we'll be dealing with in this chapter.

```
                       ftproot
                       /     \
                      /       \
                     /         \
                    /          pub (& many files
                   /                  directories
                 nic                    not shown)
                 / \
                /   (many files &
               /      directories
            nwnet       not shown)
             / \
            /   (many files &
           /      directories
     learnftp        not shown)
        /|\
       / | \
      /  |  \
     /   |   \
    /    |    \
file1  file2   more
                directories
```

Keep this image of an upside down tree in mind whenever you use FTP hosts, and navigating through FTP directories should be much easier for you.

Each directory has a name which describes what it contains. In this example, "nic" is for "network information center," "nwnet" is for "NorthWestNet" and so forth.

Another way of looking at this system is to think of directories as the electronic equivalent of manila folders, which can hold individual documents (files), or even other folders, and so on.

For example, you might have a folder in your desk called "Letters." Inside this folder, you might have other folders labelled "Amie," "Doug," and "Kristine," holding letters to and from these friends. Inside the Kristine folder, you might also have another folder named "Mexico, 1990," which would hold those letters Kristine wrote to you during her trip to Mexico.

USING ANONYMOUS FTP

Getting started:

On most mainframes, workstations, and many personal computers, you should be able to start an FTP session simply by typing "ftp."

However, if you are using a computer which uses "pull down menus," such as the Apple Macintosh, DOS machines running Windows, and some workstations, you might have to start FTP by clicking an icon. Look for a file called NCSA Telnet, Mac TCP/IP, or any application file which contains the letters TELNET, TCP, IP, or FTP. Once you've launched FTP from a menu driven application, you should be able to follow the examples as they are written, but you might also have the option of automating much of your session with special features from the menu.

The following example will demonstrate and explain the steps you'll need for most anonymous FTP sessions. Everything you should type is printed in lower case letters.

What you want to do:	What you type:
1) Start the FTP program:	ftp
2) Select an FTP host:	open ftphost.nwnet.net
3) Identify yourself	
type your FTP login name	anonymous (usually)
type your FTP password	
4) Move to the /learnftp directory	cd nic/nwnet/learnftp
5) List the contents of the learnftp directory	dir (or ls)
6) Copy the file "readme.ftp" to your computer	get readme.ftp
7) Explore the FTP host	cd directory-name (go DOWN tree to a directory) cdup (to go UP the tree one level) pwd (Print Working Directory's name) dir (directory's contents)
8) Quit an FTP session	quit (use anytime)

Feel free to explore! But be careful. You may be surprised to find just how much material you can copy in a very short time.

Commonly Used FTP Commands

Command	**Meaning or Action**
ftp	start an FTP session
name	identify yourself to an FTP host
password	same
cd (& cdup)	change directories down (and up)
dir (or ls)	list the contents of a directory
ascii	prepare FTP for a text-only transfer
binary	prepare FTP for a binary file transfer
get	copy a file from FTP host to your computer
quit	end your FTP session

A Short List of Particularly Good FTP Hosts

There are thousands of Anonymous FTP sites around the world. The "For More Information" section tells you how to obtain a large list of such sites. In the meantime, here are examples of some generally useful and well organized FTP hosts in the United States so you can start exploring right away. Have fun!

ames.arc.nasa.gov
archive.cis.ohio-state.edu
belch.berkeley.edu
cs.arizona.edu
export.lcs.mit.edu
ftp.cs.toronto.edu
ftp.cs.widener.edu
ftp.uu.net
gatekeeper.dec.com
genbank.bio.net
grape.ecs.clarkson.edu
ics.uci.edu
pit-manager.mit.edu
scam.berkeley.edu
ucsd.edu
uu.psi.com
uxc.cso.uiuc.edu
wuarchive.wustl.edu

An Expanded Sample Anonymous FTP Session

Here's a more expanded version of this one page summary, which describes an FTP session, step by step. Note that after typing a command, you should press the RETURN or the ENTER key (whichever works) to send what you've typed to the FTP host. If you're feeling adventurous, try one of the FTP hosts above and do some exploring!

Step 1. Starting FTP (the 'ftp' command)

Type ftp (or launch FTP from a pull down menu):

```
ftp
```

You should now see the FTP prompt, which will be with you throughout your FTP session:

```
FTP>
```

Step 2. Opening a Connection to an FTP Host (the 'open' command)

To establish a connection to an FTP host, just type "open" followed by the full Internet address of the FTP host. In this example, we'll use the NorthWestNet FTP host to get you started:

```
FTP> open ftphost.nwnet.net
```

Step 3. Identifying Yourself to the FTP Host (name & password)

Supply a user-id and password.

The user-id is usually "anonymous". Almost all FTP sites will accept the word "guest", but sometimes you will see a message, like this one, that asks for "your ident" or "your real ident". In such cases, the FTP administrator would like you to type in "your-user-id@your.internet.address" as the password:

```
FTP> NAME (FTPHOST.NWNET.NET:): anonymous
FTP> Guest login ok, send ident as password: your-user-id
```

Step 4. Changing Directories (the 'cd' command)

You are now ready to locate the files you want to copy. We've set up a special directory in the NorthWestNet FTP host to teach you how to use FTP. To get to this directory, type:

```
FTP> cd nic/nwnet/learnftp
```

'nic' means 'Network Information Center'; the meanings of the rest of the directory names should be apparent...

Step 5. Listing the Contents of a Directory (dir & ls)

Now ask ftphost.nwnet.net for a listing of the contents of the "learnftp" directory. Most FTP software supports two commands to display listings of a directory's contents--you can use:

ls	display a simple listing of files, or
dir	display a list of files including directory information

Here's a comparison of the listing of the learning directory provided by '"ls" and "dir"' (Don't forget that the FTP host will print out other messages as well. We just want you to concentrate on the listings of the files and directories as shown below.)

```
FTP> ls

readme.ftp
compressed-files
explore.ftp
ftphost.list.txt
ftphost.list.Z
```

```
FTP> dir
```

```
-rw-r--r--     1 20080       staff         4532     Oct 22 2:01          README.ftp
```

```
drwxr-xr-x     1 bin          system         512      Oct 22  9:17          compressed-files
-rw-r--r--     1 20080        staff          5365     Oct 23 4:02           explore.ftp
-rw-r--r--     1 20080        staff          49462    Oct 23  1:03          ftphost.list.txt
-rw-r--r--     1 20080        staff          168372   Oct 22 9:14           ftphost.list.Z
```

Using "ls" gave a quick and simple list of the contents of the directory. Using "dir" provided considerably more information. Most importantly for our purposes right now, the command 'dir' allows us to determine:

a. Whether the entry is a file or a directory (in column 1, '-' means file, 'd' means directory), you cannot use FTP to get directories, only files.

b. The size of the file in bytes (the column before the months). You should make sure the files you are about to copy will fit in your local computer.

c. The date and time of creation of the file or directory. This information is useful if you know that a certain file is in several FTP hosts, and you want to try to get the most recent copy.

d. The last part(s) of a file's name often gives some indication about what format the file is stored in. In this directory, there are different versions of the file 'ftphost.list' which contain the same information, stored in different formats. The file 'ftphost.list.txt' is a text only file, the file 'ftphost.list.Z' is a compressed file.

Step 6. Copying a File (get)

The file "README.ftp" is a standard, text only file, so set your FTP session to ASCII mode, and then use the get command to copy the file to your local computer. (Note that we type the filename **EXACTLY** as it appears: upper case for README, lower case for ftp.)

```
FTP> ascii
FTP> get README.ftp readthis.ftp
```

The file "readme.ftp" has now been copied to your computer, and has been put into your computer as a file called "readthis.ftp" in the directory from which you started FTP.

When copying a file from an FTP archive, you have the option of providing a new name for your local copy of the file. Although files stored in FTP archives usually have informative and easy to use names, you will inevitably encounter some extremes. Some FTP archive maintainers prefer cryptic filenames (e.g., a file could be called "t" in one FTP archive, while other FTP archive maintainers go to an expository extreme and store the same file as "Before-You-Copy-This-GECKO-GRAF.doc-file-be-sure-you-fed-your-cat".)

Strive to create concise and meaningful names for files you've FTP'd. If your computer's operating system uses a hierarchical file system (with directories), thoughtful organization and naming of directories can help tremendously by providing positional information (e.g., you could store the above file in the directory path "cat/fed" as file "GeckoGraf.doc").

Of course, you must be aware of the file naming conventions used by your computer's operating system. For example, IBM PC's running DOS require filenames to fit the following format:

```
A:filename.ext
```

where "A" indicates a disk drive, "filename" is a name no longer than eight characters in length, and "ext" is a filename extension no more than three characters long. For example, the FTP command:

```
get ftphost.list.txt A:ftplist.doc
```

would result in a file on your "A disk drive" with an orthodox DOS name. Other operating systems, such as UNIX and Macintosh OS are less restrictive about filename lengths, but may still prohibit the use of certain characters in filenames.

Step 7. Exploring an FTPhost (cd, cdup, dir, pwd)

If you followed the instructions up to this point, you should currently be in the 'learnftp' directory, within the 'nwnet' directory, within the 'nic' directory. A much easier way of representing this is:

```
/nic/nwnet/learnftp
```

You can type "cdup" or "cd .." to go back one directory, and then "pwd" to print your current directory (Print Working Directory):

```
FTP> cdup
FTP> pwd
```

```
current directory is /nic/nwnet
```

You can then type dir to see what's in the "nwnet" directory. If you want to go into a directory within the "nwnet" directory, you'd type

```
FTP> cd directory-name
```

or if you wanted to go back another step in the directory, you could type

```
FTP> cdup
FTP> pwd
```

```
current directory is /nic
```

Of course, if you find something you want to copy, you would use the get command, just as described previously in Step 6.

With these four commands--cd, cdup, dir, and pwd--you can explore the contents of this and any other FTP host in the world.

Step 8. Ending an FTP Session

Just type:

```
FTP> quit
```

and you should be back in a normal session on your computer.

Depending upon the particular version of FTP you are running, you may be able to take shortcuts here and there. There are also many messages which the FTP host will send to your screen, but for the sake of simplicity, we have only included the most important in this example.

FULL SERVICE FTP

If you have computer accounts on two or more computers on the Internet, "full service" FTP makes it possible for you to move files from one of your accounts to the other(s).

With full service FTP, you can put files into an account, and remove files or directories from that account.

Here's an example full service FTP session:

Step 1. START FTP

Just type: ftp

Step 2. NAME A COMPUTER ON WHICH YOU HAVE AN ACCOUNT

Type "open" followed by the Internet address of a computer on which you have an account:

```
        FTP> open YOUR.HOSTS.INTERNET.ADDRESS
```

Step 3. SUPPLY YOUR USERID AND PASSWORD

```
Name (your.host.internet.address): your-user-id
Password required for YOUR-USER-ID.
PASSWORD: your-password
230 User YOUR-USER-ID logged in.

        FTP> delete dead.letter

250 DELE command successful.

        FTP> quit

221 Goodbye.
```

Getting Help In FTP

Whenever you are using FTP, you can type help to get a list of all the commands which are available to you. Here's an example of the help listing given by a typical UNIX FTP host:

```
        FTP> help

!               cr              ls              prompt          runique
$               delete          macdef          proxy           send
account         debug           mdelete         sendport        status
append          dir             mdir            put             struct
ascii           disconnect      mget            pwd             sunique
bell            form            mkdir           quit            tenex
binary          get             mls             quote           trace
bye             glob            mode            recv            type
case            hash            mput            remotehelp      user
cd              help            nmap            rename          verbose
cdup            image           ntrans          reset           ?
close           lcd             open            rmdir
```

Now type help for any command, and you'll get a terse definition of what the command does:

```
        FTP>    help delete
        delete  delete a file
```

Because there are several versions of FTP for different operating systems, it's always a good idea to type "help" and see what commands are available if you are having problems. You might find that some familiar commands are not present on the machine you are using. Using FTP on IBM CMS and TOPS-20 mainframes is different from the examples given above, so be forewarned!

Finding Out if FTP is on your Computer

If simply typing FTP doesn't give you the FTP prompt you can find out if FTP is available by asking your instructor or your user services staff.

As mentioned above, you may have to invoke a software package of which FTP is a part. For example, some packages on computers such as the Apple Macintosh, IBM PCs, and Amigas, may have FTP bundled with other applications.

You can also try your local online help system. Here are some of the more common forms of help syntax you might use.

help ftp or help tcpip	VMS, CMS, some Unix machines
man ftp or man ftpd	most Unix machines
find telnet or find tcp	Macintosh (using the Find File application from the "apple" menu)

For More Information On FTP

"List of Anonymous FTP Sites," Jon Granrose.

FTP Host:	pilot.njin.net
directory:	pub/ftp-list
files:	README help index ...and many others

Two USENET newsgroups deal specifically with FTP archives. Read chapter 8 of NUSIRG for more information on using USENET.

comp.archives:	Announcements about new and Updated FTP files
comp.archives.admin:	Frequent discussion about FTP archives, access, administration, etc..

For example, the "Short List of Particularly Good FTP Hosts" provided in this chapter was derived from a posting by Ed Vielmetti to the group "comp.archive.admin."

Technical References On FTP

Comer, D. E. 1991. "Internetworking With TCP/IP." Volume 1: Principles, Protocols, and Architecture. Prentice Hall, Inc., Englewood Cliffs, NJ. Chapter 23.

RFC959: The File Transfer Protocol (available via anonymous FTP from nis.nsf.net in the "rfc" directory).

THE ABC'S OF HANDLING SPECIAL FILES

Archives, Binary Files, and Compressed Files

Many files on FTP archives and other computers are in a text only format which can be copied directly to your computer and displayed with a text editor without any special processing. However, you will certainly encounter computer files which are stored in special forms, and need to be transferred and/or processed in particular ways if you want to be able to use them.

There are three main kinds of special formats to look out for:

- ❏ binary files
- ❏ compressed files
- ❏ archived file groups

and any combination of these three.

Before going through some examples of how to process archived, compressed, and binary files, some definitions will be useful.

Archived File Groups

When several files are logically related in some way, they are sometimes put together and stored as one archive file. This makes it easier for you to copy the information to your computer. You need only to use the FTP "get" command once to transfer the whole archive file to your computer. You can then run a program on your local computer to unpack the archive into its component files.

One commonly encountered archive format on the Internet is called "tar", which is short for "tape archive." These tar archives are created, and unpacked, using the tar program on UNIX copyrighted computers. Files which have been archived with tar should contain the word "tar" at or towards the end of their filename.

Similarly, there are other archive programs for UNIX and most other computer operating systems, and each one of these will add a special suffix to the file's name.

For example, there is a file containing a complete, text only copy of NUSIRG on ftphost.nwnet.net, in the directory path /nic/nwnet/users-guide, called nusirg.whole-guide.txt.tar.Z.

But what does the "Z" in the filename "nusirg.whole-guide.txt.tar.Z" mean?

Compressed Files

As the name suggests, compressed files are files which have been made smaller so that they take up less space on a computer disk or other storage media. Because they are smaller, compressed files are also transferred through the Internet more quickly than the original, uncompressed files.

In the example above, the letter "Z" indicates that the file "NUSIRG.txt.tar.Z" has been compressed by the Unix compress program. Again, there are many other compression programs for UNIX and other operating systems, and each will add a particular suffix to the file's name.

Binary Files

Text on most computer screens is displayed as lower and upper case letters, numbers, and special characters, such as !,@,#, and so forth, which are easy for you to read.

The only information computers can "read," however, is binary code, numbers made up of 1's and 0's. Most computers use standard translation conventions, either ASCII or EBCDIC, to store text. Binary files, on the other hand, typically refer to "non-text" files such as bitmaps or computer programs. Most compressed files are stored in "binary" format.

The important thing to remember about binary files when you use FTP is that they must be transferred using FTP binary mode. Otherwise the file will be translated to ASCII (or EBCDIC for IBM users) and be useless when it gets to your computer.

You put FTP into binary mode by typing the word "binary" at the FTP prompt. When you're not sure what format a file is in, you should try using binary. Regardless of whether it is actually in binary or ASCII, the file will usually get to your computer just fine.

You should be aware that FTP's on some computers have additional modes which you might need to use, such as tenex.

Quick Guide to Common Un-Archive and Un-Compression Programs

Some FTP hosts have a README file in each directory which provides brief descriptions of the file in that directory. The README file also indicates which, if any, of the files in the directory need special handling, and if so, what that handling should be. It's always a good idea to get such README files before you start getting a lot of files from an FTP host. It can save you a lot of grief!

However, many FTP hosts do not have these files (and sometimes we are too impatient to take the time to get README files), so sometimes we have to guess.

Suppose you FTP'd the following files onto a UNIX computer:

file1.txt
file2.shar
file3.tar.Z

In the paragraphs below, you can find out what needs to be done to each of these files before you can use them:

For file 1, "txt" is one of several common extensions used for text-only files, so file1 can most likely be read directly with a standard UNIX text editor.

For file 2,"shar" is the file extension often used to denote a "shell archive." To process file2.shar, you usually can find directions at the top of the file like "Delete everything above the 'cut here' mark, and then type "sh this file."

Finally, file 3 has two extensions: "tar" and "Z". First we would use the "uncompress" program, which will make a file called "file3.tar". We would then use then the "tar" program to unarchive the file into it component parts.

Archive or Compression Program Name	Added File Extension	Name of program *you* use to process this file on your computer's operating system	
		DOS	Mac
ARC	ARC	arc602.exe	ArcMac
BinHex	Hqx	xbin23.zip	BinHex
compress	Z	u16.zip	MacCompress
PackIt	pit	UnPackIt	PackIt
PKZIP	ZIP	pkz110eu.exe	UnZip
SHellARchive	shar	toadshr1.arc	UnShar
StuffIt	Sit	mactopc	StuffIt
tar	tar	tar.zip	UnTar
uuencode	uu	toaduu20.zip	uutool
ZOO	ZOO	zoo201.exe	MacBooz

Archive or Compression Program Name	Added File Extension	Name of program *you* use to process this file on your computer's operating system	
		UNIX	VM/CMS
ARC	ARC	arc521	arcutil
BinHex	Hqx	mcvert	binhex
compress	Z	uncompress	compress
pack	z	unpack	-
PackIt	pit	unpit	-
PKZIP	ZIP	unzip41	-
SHellARchive	shar	unshar	-
StuffIt	Sit	unsit	-
tar	tar	tar	-
uuencode	uu	uudecode	arcutil
ZOO	ZOO	zoo201	zoo

For More Information

A comprehensive table of nearly 100 programs for unpacking archives and uncompressing files is maintained by David Lemson. His document also gives detailed information on where all listed programs can be obtained. Most of them are available via anonymous FTP. Here's the information for the location of the "master" copy, which should be up to date.

FTP Host:	ux1.cso.uiuc.edu
directory:	doc/pcnet
filename:	compression

This file is available on other FTP hosts as well.

USENET Discussion Groups

The following USENET discussion groups deal specifically with the theory and practice of file compression.

alt.comp.compression
comp.compression

Useful information about file compression is often presented in the following operating system specific groups as well.

comp.binaries.amiga
comp.binaries.apple2
comp.binaries.atari.st
comp.binaries.ibm.pc
comp.binaries.mac
comp.binaries.os2

If you don't know how to use USENET, refer to Chapter 7 of NUSIRG, "Using USENET."

Chapter 5: TELNET

USING TELNET

What is TELNET For?

TELNET is an Internet application used for logging in to other Internet computers.

With TELNET, you can access:

- o Online databases
- • Electronic library catalogs
- o Internet information services
- o Computers on which you have an account

In practice, there are two kinds of TELNET.

"Guest TELNET" allows you to login to a computer through a special guest account from which you can perform a restricted, but still useful set of tasks.

"Full privilege TELNET" allows you to login to a computer on which you have a regular account, and to do your normal work on this computer from any other computer connected to the Internet.

TELNET is one of the "application level services" of TCP/IP (Transmission Control Protocol / Internet Protocol) which computers throughout the Internet use to communicate. For more detailed information on the technical aspects of TELNET, obtain the references in the section entitled "For More Information."

Note that when you access Internet services which are installed on IBM mainframes, you will sometimes need to use a special version of TELNET called "tn3270" which allows full screen TELNET sessions on IBM mainframes. From your perspective, tn3270 works just like TELNET, and you can simply substitute "tn3270" for TELNET. This is especially important when connecting to IBM mainframes from UNIX hosts.

How Do You Use TELNET?

If TELNET is installed on your computer, you can usually type "telnet", followed by another computer's Internet address. Sometimes you will also have to type in a userid or other login information.

For example, to login to the University of Maryland's INFO program, you'd type:

```
telnet info.umd.edu
```

In a short time, the computer in Maryland should prompt you for a login id; just type "info" after the word "login:"

```
login: info
```

You will then be asked what kind of terminal you are using. To take full advantage of this particular TELNET site, you should type 'vt100', or some other "full screen emulation" terminal type which allows you to use cursor keys, etc.) Throughout this session, you will see instructions on your screen about what to do. If you get confused in this or any other TELNET session, just type "help" or "?". Or, go to the section entitled "TELNET Troubleshooting" for solutions to some of the more commonly encountered problems. Here's a list of a few of the many TELNET sites on the Internet which offer valuable and interesting services. Enjoy!

A Brief List of Some Representative TELNET Sites

1. TELNET Sites Which Work With Most Kinds of Terminals

Name	Internet Address	Login Info	Services
CARL	pac.carl.org	none needed	Library Catalogs
DDN NIC	nic.ddn.mil	none needed	Internet info, find computer addresses, etc.
Knowbot	sol.bucknell.edu 185	none needed	Find computer
Knowbot	nri.reston.va.us 185	none needed	addresses
MELVYL	melvyl.ucop.edu	none needed	Library Catalogs

2. TELNET Sites Which Work Best With "Full Screen Emulation"

Name	Internet Address	Login Info	Services
PENpages	psupen.psu.edu	user: pnotpa	Agricultural Information
SpaceLink	128.158.13.250	user: newuser pass: newuser	NASA & Space info.
UMD INFO	info.umd.edu	login: info	Many kinds of information
UNC INFO	info.acs.unc.edu	login: info	Univ. North Carolina info.

The best way to learn about TELNET is to use it. There is a sample session to try at the end of this chapter.

The rest of this document gives more detailed, but still nontechnical, information about TELNET.

Additional Information for Personal Computer Users

If you're connecting to the Internet from a personal computer, there are two main ways to use TELNET:

- If you are a modem user, you can login to a mainframe or a telecommuncations provider using a terminal emulation program, and then use the mainframe or telecommunication provider's TELNET software.

- o If you are using a personal computer connected directly to the Internet you may be able to use a TELNET program installed on your personal computer.

Typical TELNET Sessions

We'll illustrate the use of TELNET with two examples: 1) logging in to a VMS computer from a UNIX computer, and 2) logging into an Internet Information Service to a public TELNET account.

In these sample sessions, lines are labeled as follows:

U> Commands entered by you
T> Responses from TELNET
P> TELNET or operating system prompts where you type a response on the same line as the prompt; text you enter is underlined.

Text with no line labels are explanations.

Example 1. Using TELNET to Login to Another Computer on Which You Have an Account

If you have computer accounts on two or more computers, substitute the names of those computers for the hypothetical Internet addresses supplied in this example.

This example illustrates that you can usually get online help for TELNET within each of the operating systems, and help from the TELNET program while at the TELNET prompt.

1) In UNIX, you can type "man telnet" to get UNIX specific help on TELNET (in UNIX jargon, "man" is short for "manual page"):

```
P> UNIXhost% man telnet
```

You will then see a page of the TELNET manual.

```
TELNET(1C)              DYNIX Programmer's Manual              TELNET(1C)

NAME
        TELNET - user interface to the TELNET protocol

SYNOPSIS
        TELNET [ host [ port ] ]

DESCRIPTION
TELNET is used to communicate with another host using the TELNET
protocol.  If TELNET is invoked without arguments, it enters command
mode,indicated by its prompt ("TELNET>").  In this mode, it accepts and
executes the commands listed below.  If it is invoked with arguments,
it performs an open command (see below) with those arguments.

Once a connection has been opened, TELNET enters an input mode.  The
input mode entered will be either "character at a time" or "line by line"
depending on what the remote system supports.

--More--
```

Now let's start a TELNET session by just typing TELNET.

```
P> UNIXhost% telnet
T> telnet>
```

We are now running the TELNET program on the UNIX host. Let's see what help the TELNET program has to offer (what you see might be different):

```
P> telnet> help

T> Commands        may be abbreviated.  Commands are:

T> close           close current connection
T> display         display operating parameters
T> mode            enter line-by-line or character-at-a-time mode
T> open            connect to a site
T> quit            exit TELNET
T> send            transmit special characters ('send ?' for more)
T> set             set operating parameters ('set ?' for more)
T> status          print status information
T> toggle          toggle operating parameters ('toggle ?' for more)
T> z               suspend TELNET
T> ?               print help information
```

Notice that additional help can be obtained for some of the commands which have suboptions (e.g., "set ?").

Now let's open a session to another computer on which we have a regular account and password (substitute the name with a computer on which you actually have an account.):

```
P> telnet> open vmshost.internet.computer.address
T> Connected to vmshost.internet.computer.address
T> Escape character is '^]'.
```

From this point on, your terminal will display a session which is just like what it would be if you were logged in directly.

```
T> Welcome to VMSHOST.  Please log in.
P> Username: your-userid
P> Password: your-password
T> Welcome to VMSHOST, running VAX/VMS V5.4-1.
T> Last interactive login on Thursday, 2-SEP-1991 16:17
T> Last non-interactive login on Thursday, 2-SEP-1991 16:21
```

Now that we are in the VMS machine, let's use the VMS help system to get information about TELNET on VMS.

```
P>  $ help telnet
T>  TELNET
T>  TELNET is a subsystem to allow users to connect their
T>  terminal to other systems on a network.  TELNET
T>  supports communication using the TCP/IP, CHAOSnet
T>  and PUP protocols.
T>  Format:
T>  TELNET [host-name]

T>  Additional information available:

T>  Parameters Command_Qualifiers

P>  Press RETURN to continue ... <return key>

P>  TELNET Subtopic? <return key>

P>  Topic? <return key>
```

We can close our connection to VMSHOST by logging out normally, and we will be returned to the UNIX session from which we had started:

```
P> $ logout

Unixhost%
```

We've closed the connection to VMSHOST; if we wanted to we could enter more TELNET commands or start another session. But let's quit TELNET:

```
P> telnet> quit

UNIXhost%
```

Example 2. TELNET Session to an Internet Information Server

This example shows how TELNET can be used to access special guest accounts on Internet computers.

The process of connecting to such guest accounts is the same: you type "telnet internet.host.address". But once you are connected, every site has different features and user interfaces, so don't expect the details of this example to represent anything but INFO at "info.umd.edu"!

```
U> telnet info.umd.edu
T> Trying...
T> Connected to dbserv.UMD.EDU.
T> Escape character is '^]'.
```

For this and most TELNET sessions, pressing the "Ctrl" or "Control" key followed by the "]" key will close your TELNET connection to another machine. ("^" is the standard abbreviation for the control key in most computer manuals.)

You will now be prompted to log in as:

```
T>  Ultrix V4.1 (Rev. 52)

T>  At the "login:" prompt below, enter:
T>  INFO                                      for access to the Information
T>                                            On-line files and programs.

P> login: info

T> Last login: Sat Sep 21 00:25:33 from annex2.umd.edu
T> Ultrix V4.1(Rev 52)System #2: Tue Jan 15 11:01:34 EST 1991
T> UWS V4.1 (Rev. 197)
```

You will now be prompted for your computer's "terminal type." When you use some TELNET services, you can ask for a display of what kinds of terminal emulation are supported at that site.

```
T> Please enter your terminal type
P> (? for a list, RETURN for 'vt100'): ?
```

Terminal type does not mean "is you computer a Macintosh or an IBM mainframe?" but rather, "what kind of terminal can your computer 'emulate'." Any particular computer can, depending upon installed software, emulate one or more terminal types.

```
T>  A list of supported terminals follows.  Enter the type of your terminal
(in lower case):

T>  type         description
T> aaa           Ann Arbor Ambassador (24 lines)
T>  dt80         Datamedia DT80
T>  h19          Heathkit H-19 (also MD-PC/IP TELNET program for PCs)
T>  h29          Heathkit H-29
T>  kk           Kermit VT-102 full-screen (for campus IBM mainframes e.g.,
                 DO IBM)
T>  m4           Microterm (MIME) 340/314 in ACT-IV Mode
T>  sun          Sun Microsystems Workstation Console
T>  vt100        DEC VT-100 (also NCSA TELNET program for PCs & Macs)
T>  vt102        DEC VT-102
T>  vt200        DEC VT-200
T>  vt52         DEC VT-52
T>  xterm        X-windows vt100 terminal emulator (24 lines)
T>  z19          Zenith Z-19 (like Heathkit H-19)
T>  z29          Zenith Z-29 (like Heathkit H-29)
```

If you're not sure what kind of emulation you have available, try "vt100", which is a kind of full screen emulation available on many computers.

```
T> Please enter your terminal type
P> (? for a list, RETURN for 'vt100'): vt100
```

Your terminal will now display the following introductory information about the Info system. Whenever online help is displayed, take the time to read it!

```
View     Return     Select     X-fer    Go-To      Protocol     Quit    INFO2.0

                              Welcome to INFO!

MENU OPERATION:

The menus will be available after you press a key to clear this screen.

To select a menu item, press the arrow keys to highlight the item (such as VIEW or
SELECT), and then press Return or Enter. You can also select a menu item by typing the first
letter of that item. For example, pressing V selects the VIEW option.

Help is available everywhere.  If you get stuck you can press the ? key, and information about
the highlighted menu item will appear on the screen.

                                                        Press any key to continue...
```

When you press any key, you will see the main menu.

```
VIEW    Return    Select    X-fer   Go-To     Protocol    Quit     INFO

13 FILES IN /

        Name                 Description              protocol = None

1    Computers      Directory    11 Sep, 1991    15:17
2    EconData       Directory    05 Jun, 1991    00:00
3    Literature     Directory    18 Sep, 1991    10:41
4    Macintosh      Directory    20 Sep, 1991    19:00
5    NewsLetters    Directory    19 Aug, 1991    12:30
6    PC             Directory    20 Sep, 1991    23:32
7    USGovt         Directory    06 Aug, 1991    16:13
8    UofMaryland    Directory    16 Sep, 1991    18:16
9    Weather        Directory    30 Jul, 1991    10:12
10   World          Directory    18 Sep,1991     15:13
11   info.cat       File         20 Sep,1991     19:00    50866 bytes
12   update.cat     File         20 Sep,1991     07:00    13110 bytes
13   welcome        File         12 Sep, 1991    11:32    1782 bytes
 Use the up/down arrow keys to select a directory or file, press the first letter of a menu item
to act on the selection. Press ? for help.
```

Let's select USGovt. Since we're using vt100 emulation, we can press the down arrow on our keyboard until we get to item 7, and then press return to get to the USGovt menu.

```
10 FILES IN /USGovt

     Name                Description             protocol = None

1    .. (Previous)   Directory    12 Sep, 1991    11:32
2    Bills           Directory    05 Jun, 1991    00:00
3    Constitution    Directory    01 Aug, 1991    10:56
4    Economics       Directory    02 Aug, 1991    08:46
5    GAO             Directory    06 Aug, 1991    17:23
6    SupremeCt       Directory    23 Jul, 1991    16:34
7    Taxes           Directory    05 Jun, 1991    00:00
8    education-      File         04 Jun, 1991    12:00    1927 bytes
     goals.txt
9    represen-       File         25 Jul, 1991    11:26    16456 bytes
     tatives.txt
10   senators.txt    File         25 Jul, 1991    11:26    4258 bytes
Use the up/down arrow keys to select a directory or file, press the first letter of a menu item to
act on the selection. Press ? for help.
```

Again, move the cursor down to a line you want to select. Let's go to line 6 to the supreme court directory.

```
VIEW    Return    Select    X-fer    Go-To     Protocol    Quit    INFO
```

```
6 FILES IN /USGovt/SupremeCt

         Name                    Description                     protocol = None

1      .. (Previous)       Directory       06 Aug, 1991       16:13
2      1989term            Directory       23 Jul, 1991       16:33
3      1990term            Directory       23 Jul, 1991       16:34
4      00index.cat         File            23 Jul, 1991       16:33        12656 bytes
5      00readme.txt        File            23 Jul, 1991       16:33        2692 bytes
6      justices.txt        File            23 Jul, 1991       16:34        19299 bytes
Use the up/down arrow keys to select a directory or file, press the first letter of a menu item to
act on the selection. Press ? for help.
```

Finally, we will view the document "justices.txt" by moving the cursor to line 6 and pressing the Return key.

```
TOP      Bottom     Up      Down      Left      Right      Number      Search      Quit

/USGovt/SupremeCt/justices.txt              lines 1 - 17 of 314

JUDICIARY

SUPREME COURT OF THE UNITED STATES

One First Street NE, 20543.   Phone, (202) 479-3000



WILLIAM HUBBS REHNQUIST, Chief Justice of the United States, born in Milwaukee, WI,
October 1, 1924; son of William Benjamin and Margery Peck Rehnquist; married to Natalie
Cornell of San Diego, CA; children: James, Janet, and Nancy, member of Emmanuel
Lutheran Church, Bethesda, MD, served in the U.S. Army Air Corps in this country and
overseas from 1943-46, discharged with the rank of sergeant, Stanford University, B.A.,
M.A., 1948; Harvard University, M.A., 1950; Stanford University, LL.B., 1952 ranking first
in class; Order of the Coif; member of the Board of Editors of the Stanford Law Review; law
clerk for Justice Robert H. Jackson, Supreme Court of the United

(more text)

Use the up/down arrow keys to select a directory or file, press the first letter of a menu item to
act on the selection. Press ? for help.
```

To exit "info.umd.edu" you can press "Ctrl]". You will see

```
T> telnet>
```

on your screen. You can either enter "open another.internet.computer.address", or "close", to terminate your TELNET session.

TELNET TROUBLE-SHOOTING

Step 1. If just typing "telnet" doesn't give you the "TELNET>" prompt:

- o Try typing "help telnet", "man telnet", "info telnet" or whatever command is appropriate to your operating system. You might also try "tcpip" instead of "telnet",
- o or contact your local user services personnel.

Step 2. If you type "telnet an.internet.computer.address" and you don't get connected:

- o "unknown host" message: You might have misspelled the computer's domain name, or the domain name of the computer might have changed.
- o "foreign host did not responding within OPEN timeout" message: There's probably too much traffic somewhere on the Internet between you and the host, or the host is disabled in some way. Try again later.
- o There might be a limit on the number of users allowed onto the host at a given time. You will usually get some sort of explanation from the host to this effect. Try again later.

Step 3. When logging in to a VM/CMS mainframe from a UNIX host, TELNET will only give you "line-at-a-time" service. You should use a 3270 emulator for full screen service.

WHAT RESOURCES CAN BE ACCESSED WITH TELNET?

There are many very interesting and valuables services listed in several chapters of NUSIRG and in the documents referenced in these chapters:

Chapter 6: Archie: The FTP Guru

Chapter 11: Accessing Library Catalogs Through the Internet

Chapter 12: Internet Accessible Databases and Bibliographies

Chapter 13: The Wide Area Information Server (WAIS)

Chapter 14: Internet Directory Services

FOR MORE INFORMATION ON TELNET

Technical Descriptions of the TELNET protocol

Douglas E. Comer. 1991. "Internetworking with TCP/IP." Vol. 1. Prentice-Hall, Inc. Chapter 22: Applications: Remote Login (TELNET, RLOGIN), contains a relatively accessible discussion of the technical aspects of TELNET.

Authoritative sources for technical information about TELNET (and most anything else about the Internet) can be found in "RFC" (Request for Comments) documents.

Here's a partial list of relevant RFC's on TELNET:

RFC 854: "TELNET Protocol Specification"
RFC 764: "TELNET Protocol Specification"
RFC 855: "TELNET Option Specifications"
RFC 856 - RFC 861: Many other TELNET options specifications

Although RFC's are available from many other sources on the Internet, here are instructions on how to obtain RFC's from two definitive RFC repositories:

1. Via FTP:

FTP Hosts: nis.nsf.net
directory: rfc
files: rfcxxx.txt (where xxx is the RFC number)

2. Via electronic mail messages to nic.ddn.mil's automated "mail server":

mail service@nic.ddn.mil
subject: rfc xxx

Information On TCP/IP Packages for PCs Which Include TELNET

"Network Protocol Implementations and Vendors Guide" is a 300+ page description of TCP/IP hardware and software available at no charge via FTP and electronic mail, or for purchase by land mail:

FTP Host: nic.ddn.mil
directory: netinfo
file: vendors-guide.doc

e-mail: mail service@nic.ddn.mil
subject: (none needed)

mail: DDN Network Information Center, SRI International
333 Ravenswood Avenue, Room EJ291
Menlo Park, CA 94025 ($45 if ordered by postal mail.)

Chapter 6: "Archie": The FTP Archive Guru

WHAT IS ARCHIE?

Archie is a computer program which maintains a constantly updated catalog of the contents of a large proportion of the world's anonymous FTP archives. Archie is rapidly becoming one of the more useful computer resources on the Internet. It's well worth your time to learn how to use it.

WHAT IS ARCHIE USED FOR?

There are thousands of computers on the Internet which offer anonymous FTP services. Once you know how to use FTP, you are faced with some challenging tasks. How do you find out which FTP site has the file you're looking for? For that matter, how can you find out which FTP site has the most up-to-date version of whatever file you're looking for?

To keep track of the contents of these services before Archie, you either had to be an FTP archive guru who stayed awake all night prowling through the Internet, or else be lucky enough to know one.

Archie is an FTP guru for everyone on the Internet. Archie is ready and able to answer your questions.

HOW DOES ARCHIE DO IT?!

There are two major parts of the Archie program:

- The first part of the Archie program is responsible for monitoring the contents of FTP archive sites. Each month, the Archie program:
  - does an anonymous FTP to all sites contained in its master list of sites,
  - requests a directory listing of their contents, and
  - updates master catalogs of the holdings of all FTP sites.
- The second part of the Archie program (the part you'll use) allows you to search through the master list of FTP files, just like you might use a library catalog to find a book on a particular topic.

Archie's output includes the Internet domain name of the FTP host, the directory in which a file is located, the size of the file in bytes, and the date on which the file was placed in that FTP host. Once you've gotten this list of possible sources from Archie, you FTP to a site which has what you need, go to the subdirectory in which Archie says the file is located, and copy the file to your own computer.

WHAT KINDS OF QUESTIONS CAN ARCHIE ANSWER?

Archie can currently answer two kinds of questions:

- Is there a file containing a particular set of characters in its filename on an FTP host somewhere? In the rest of this chapter, this will be referred to as a FILENAME SEARCH.

- Is there a file dealing with a certain subject which has been cataloged by subject?

You can search the "PD (or Public Domain) Software Description Database," which contains descriptive information about the actual contents of a small subset of the files known to Archie. This will be called a FILE CONTENTS SEARCH.

It's incredibly useful that Archie is set up to perform file contents searches. You'd be amazed at the obscurity of the filenames which some people give their programs or files.

Just as a hypothetical example, you might think that a "Computer Aided Design" program would have the letters "CAD" somewhere it it's name; but more often than you'd like, a CAD program might have a name like "TLZWYQXP.DTU". In such a case, you just have to hope that the author(s) of this program had the foresight to send a message to the Archie folks saying that "TLZWWQXP" was a CAD program.

To get you started, try one of the following sample sessions with Archie in which you'll search for files containing information about NorthWestNet, using both FILENAME and FILE CONTENTS searches.

Once you've gone through one of these examples, you'll have the skills you need to go ahead and use Archie for whatever kind of search you might want to make.

HOW DO YOU USE ARCHIE?

Archie Syntax

The basic search command of Archie is "prog". Entering the command string

```
prog textstring
```

will find all files that contain the word "textstring" in their filenames.

A full explanation of Archie syntax can be gotten with the "help" command in either of the two access methods described below.

Archie By E-Mail

You can use Archie by e-mail. First time users should request a help file with the following message:

```
mail:           archie@archie.mcgill.ca
subject:        help
```

If you are accessing Archie by mail, you can put Archie search requests, one per line, in the body of your message (Archie will also read requests placed in the subject line). For example, entering the following command string

```
mail:    archie@archie.mcgill.ca
subject: (none needed)
         prog gateways
```

```
prog nwnet
```

will search for files containing the words "gateways" or "nwnet" in their filenames. Note that a subject is not needed.

Archie By TELNET

Here are the steps for accessing Archie over the Internet:

Step 1. Use TELNET to access a remote Archie server. If you don't have access to TELNET or if you're not sure how to use TELNET, be sure to read Chapter 5 of NUSIRG, or ask your instructor or you local user services staff for help. However, if you do wish to use TELNET to access Archie, here are the domain name addresses of the computers which support public access to Archie.

- If you're in North or South America, TELNET to the Archie host nearest you:

archie.ans.net	(New York, USA)
archie.mcgill.ca	(Montreal, Canada)
archie.rutgers.edu	(New Jersey, USA)
archie.sura.net	(Maryland, USA)
archie.unl.edu	(Nebraska, USA)

- If you're in Eurasia or Africa, TELNET to either:

archie.doc.ic.ac.uk	(United Kingdom)
or nic.funet.fi	(Finland)

- If you're in Australia, New Zealand or Oceania, TELNET to:

archie.au	(Australia)

Step 2. Use the login name "archie". No password is required. You should see a short help screen giving some basic help explaining how to use the system. You may also see information about recent changes to Archie.

You can get additional help about Archie at any time during your session. Typing

```
help
```

will give you a list of currently valid commands. To obtain help on a particular command from the displayed list, just type help and the command-name. For example, to get help on the "prog" command, type

```
help prog
```

Step 3. Now you're ready to do a FILENAME SEARCH for all documents in the Archie file catalog for any document containing the text string "nwnet" in its filename, regardless of whether the filename is upper case, lower case, or any mixture of upper and lower case. All you need to do is to type:

```
prog nwnet
```

While Archie is searching, it will display the percentage of filename databases it has searched, and the number of occurrences of the string "nwnet" it has found.

If a search seems to be taking a very long time, or resulting in hundreds of possibly spurious "hits," or positive locations of the character string, you can stop Archie by pressing "control c" (press the "control" key - sometimes labelled "ctrl" and the "c" key simultaneously).

Step 4. When Archie is done searching, it will display:

- o the files whose names contain the string "nwnet"
- o in which FTP hosts these files can be found and
- o the subdirectory path in which they are located.

Step 5. If you want to e-mail a copy of the results of this search back to your own Internet user-id, just type

```
mail YourUserId@your.full.internet.address
```

This means that you can look at the results of your searches at your leisure. This is an especially good idea since it means you can logout of Archie as soon as you're done. This will make a connection available for another person to login to Archie. Remember, Archie, like most Internet resources, has a limited number of users it can serve at once! The more quickly AND efficiently you use it, the more other people can use it.

Step 6. Now try a quick FILE CONTENTS SEARCH. Just type:

```
whatis nwnet
```

All lines in the "PD Software Description Database" which contain the string "nwnet" will be displayed. Again, you can use the command

```
mail YourUserId@your.full.internet.address
```

to have the results of this search sent back to your account.

Step 7. To end your Archie session, simply type

```
quit
```

Step 8. Any search results you mailed back to your userid should be sent to you as incoming mail within a few minutes.

THINGS TO KEEP IN MIND BEFORE YOU USE ARCHIE

Archie currently keeps track of more than 800 FTP hosts, containing more than 1,000,000 files. If you're not careful, you could easily generate thousands of "hits" that are not really meaningful answers to your inquiry. For example, "prog doc" would not be a very useful search request.

Think about your search very carefully before you TELNET to Archie. Learn to take full advantage of the many search options described in the Archie manual to restrict your search.

There are many more features to Archie than can be described in this brief introduction. So, before you use Archie for real searches, be sure to use the "help" command, and to read the most current Archie documentation.

Anything written about Archie (or any other Internet resource) may be out-of-date a few days after it is written. When you TELNET to Archie, and before you start your search, read the news messages that appear on your screen. The developers of Archie may have just made some major breakthrough in their program which will make using it even easier to use, but hasn't even been written up in the Archie manual.

Best of all, Archie (and most other Internet resources), will change in response to your suggestions. Once you've used Archie, the developers of Archie would appreciate your feedback and comments to make Archie even more useful. Send comments, bug reports, contributions to the database file, reports of anonymous FTP sites that Archie doesn't seem to maintain (or even much deserved notes of appreciation) to:

archie-l@cs.mcgill.ca

The Archie program was written and is maintained by:

Alan Emtage (bajan@cs.mcgill.ca)
Bill Heelan (wheelan@cs.mcgill.ca)

Ideas and inspiration were (and still are!) provided by

Peter Deutsch (peterd@cs.mcgill.ca)

FOR MORE INFORMATION ABOUT ARCHIE

The best source of up-to-date information about Archie are the login messages you see when you login to Archie. For updates, and new features, and files in the FTP host maintained by Archie's developers, access the following resources

FTP host:	quiche.cs.mcgill.ca	
directory:	archie/doc	
filename:	whatis.archie	(brief overview
	archie.man.txt	(ASCII archie manual

SECTION 3: COMMUNICATING WITH PEOPLE

USENET AND LISTSERV

> *If you have an apple and I have an apple and we exchange these apples then you and I will still each have one apple. But if you have an idea and I have an idea and we exchange these ideas, then each of us will have two ideas.*
>
> George Bernard Shaw

This section introduces you to two of the most widely used forums for communication between people on the Internet: USENET discussion groups and BITNET LISTSERV Lists.

Both USENET and LISTSERV groups are organized by topics, so you can find a group whose topic interests you and immediately "meet" people around the world who are communicating about your interests.

These services are like the cafes, village greens, and other meeting places in a global community filled with people sharing ideas, news, opinions, and just plain conversation. Feel free to join in!

Chapter 7: Using USENET

WHAT IS USENET?

USENET is a service of the Internet which allows you to participate in discussions on many different topics with people throughout the world.

More specifically, USENET is:

- ☐ a collection of hundreds of "newsgroups" covering everything from supercomputer design to bungee cord jumping;
- ☐ a forum for discussions, questions and answers, and news.

USENET is used daily by many thousands of people on computers worldwide. USENET is also a systems which evolves in response to its user's needs. Every month, new USENET groups are created in response to the votes of USENET users. And most importantly, if you use it well, USENET can be highly educational - and highly entertaining.

What Are USENET Newsgroups?

USENET discussion takes place in hundreds of USENET newsgroups, each dealing with a particular topic. The term "USENET newsgroups" might suggest that USENET is mainly concerned with "news," but USENET newsgroups (or "groups") are also forums for information, discussions, debates, questions, and answers.

Each USENET group is comprised of articles (or "postings") which are submitted (or "posted") by users from throughout the world. For those of you already familiar with electronic bulletin boards, USENET groups are very similar to bulletin board rooms, special interest groups, conference rooms, and so forth.

How Are USENET Articles Distributed Through the Internet?

The basic purpose of USENET is similar to that of LISTSERVers described in Chapter 8: to allow people with shared interests to communicate quickly and easily. However, information is distributed very differently by the two systems.

Every person subscribed to a LISTSERV group receives a copy of every file sent to the group. Because you have to handle every LISTSERV file individually as it is sent to you, the number of LISTSERV groups to which you can subscribe is limited.

In USENET, each subscribing Internet site receives as single copy of each article via a "USENET news feed." These news feeds are handled by Internet software called Network News Transfer Protocol or NNTP. The tens of thousands of USENET files which accumulate each week are stored on one mainframe, workstation, or personal computer at your site. Even if there are 1,000 people want to read a given article, only one copy needs to be stored. This system is much more resource efficient than 1,000 individual copies.

An even more efficient method of distributing USENET articles has been developed which allows a single NNTP news feed machine to be accessed by many other computers. This new method is of special interest to sites with limited computer resources, such as an elementary school with a few personal computers and modems. You don't have to have a machine at your site to store the tens of thousands of USENET articles you might not want to read. Only articles you are interested in are displayed on your screen from the remote NNTP server.

How Are USENET Newsgroups Organized?

Each USENET newsgroup has a distinct name which describes the discussion carried out in the group. Here are the names of a few of the many hundreds of USENET newsgroup names to give you a sense both of the diversity of topics, and how USENET groups names are put together:

alt.usage.english
bionet.agroforestry
bionet.software
bit.listserv.history
bit.listserv.travel-l
biz.comp.services
biz.dec.workstations
comp.sources.apple2
comp.unix.questions
k12.chat.elementary
k12.lang.francais
misc.jobs.offered
misc.rural
news.announce.newusers
news.newusers.questions
pnw.forsale
rec.arts.books
rec.food.recipes
sci.archaeology
sci.math
soc.college.gradinfo
soc.culture.nordic
talk.politics.guns
talk.rumors
uw.general
uw.jobs

All USENET newsgroup names are made up of abbreviations separated by periods, arranged in a hierarchical fashion. The first part of the name is a major category, and the second (and sometimes third, fourth, or even fifth) part(s) give increasingly more detail about the topic covered by the group.

For example, "k12.chat.elementary" is a group in the hierarchy created for kindergarten through 12th grade users (k12) oriented towards casual discussion (or chat) among elementary school students.

There are only a few first level categories, within which may be hundreds of specific newsgroups. Here's a list of the general topics covered by the some of the most commonly encountered main level categories:

alt	a hierarchy for tentative or controversial groups; not carried by all USENET sites
bionet	a hierarchy for biology oriented groups, primarily intended for research biologists
bit.listserv	LISTSERV groups distributed to USENET
biz	Business / corporate oriented discussion
comp	Computer oriented groups
k12	Kindergarten through high school groups
misc	Groups not easily fit into other categories
news	Groups devoted to news about USENET
rec	Recreation or hobby oriented groups
sci	Science oriented groups
soc	Groups oriented to discussion of particular cultures or social groups around the world
talk	Groups for free form discussions which often focus on controversial topics (e.g., abortion, nuclear energy)
pnw & uw	examples of regional USENET hierarchies which will be

explained in more detail below

Consider five hypothetical groups dealing with politics in the United States, each in a different main level hierarchy:

biz.us.politics
k12.us.politics
sci.poli-sci.us
soc.us.politics
talk.us.politics

The articles within each of these U.S. politics groups are likely to have very different emphases, which helps to serve the diversity of USENET readers.

USENET ALSO CONTAINS LOCAL GROUPS

Although most of USENET is a global community, it is also set up to address the needs and interests of users in local areas.

As mentioned above, "pnw" and "uw" are examples of "regional hierarchies." These hierarchies contain groups of interest to users in the Pacific Northwest region of the United States, and to the University of Washington, respectively. Such regional hierarchies have been set up for many other parts of the world for discussions of local interest.

Here are some examples of other regional hierarchies to give you an idea of how this system works:

Institutions	uw	Univ. of Washington
	yale	Yale University
Cities	pdx	Portland
	tor	Toronto
States or provinces	ab	Alberta
	or	Oregon
Regions	pnw	Pacific Northwest
	ne	New England
Countries	fnet	France
	nz	New Zealand
Continents	eunet	Europe
	na	North America

Regional newsgroups usually deal with topics that probably wouldn't interest users elsewhere in the world, such as where Yale's MacIntosh Users Group will meet next week, or why zucchini has suddenly become so expensive in Alberta. So don't feel like you're missing much, there are hundreds of globally distributed newsgroups to keep you busy.

A QUICK OVERVIEW OF USING USENET

What You Should NOT Do On USENET

Although USENET probably would be best described as a quasi-democratic anarchy, there are a few explicitly forbidden activities:

- ☐ Do Not Violate Copyright Or Any Other US or International Laws. Feel free to reproduce short extracts of a copyrighted work for critical purposes in your postings, but reproduction of copyrighted works in whole or substantial part is forbidden by US and international copyright law. Respect the hard work of copyrighted authors. Similarly, engaging in or communicating about illegal activities on USENET is forbidden, and could endanger you and your site's USENET feed.

- ☐ USENET Is Not For Commercial Communication. This does not mean that you can't discuss commercial products on USENET. In fact, objective descriptions and comparisons of commercial computer products is a very useful USENET activity. But, if you represent a company, don't even think of posting commercial advertisements on USENET. At the very least, you will probably be flooded by complaints from outraged USENET users, and at the worst, your company's USENET feed could be endangered.

Getting Started With USENET

To read USENET articles, you use "newsreader software." So, the first thing you need to do before getting started with USENET is to:

Find out if you have newsreader software on your computer

As you can see in addendum 1, there are many newsreader packages for both mainframes and personal computers. If you already know the name of your newsreader software, skip ahead to "A Typical USENET session."

If you're not sure of the name or even the existence of newsreader software on your computer, you should ask your local users services staff or instructor for help. Or, if you're inquisitive, and like to do things on your own, try the following steps.

- ☐ If you're using a mainframe computer connected to the Internet, try using your local help system (e.g., "help" or "man") to determine if one of the newsreading software packages listed in addendum 1 is installed on your system. For example, on a VMS system, you might try "help vnews" or on a UNIX machine try "man k news".

- ☐ If you are working from a personal computer such as a Mac or an IBM PC, you might have a PC-based news reader installed which accesses USENET through a modem. Again, try the "help" or "find" command appropriate to your computer.

- ☐ If you can't find one of the programs listed in addendum 1, one of them might be installed under a different name on your computer or you might have a newsreader we haven't listed. But, most probably, a USENET newsreader is not yet installed on your system. If so, the person administering you machine might be willing and able to install newsreading software.

A typical USENET session

Regardless of which newsreading software you use, a typical USENET session usually involves the following steps:

Step 1	Start the newsreader software.
Step 2	Select a newsgroup.
Step 3	Scan the titles of articles in that newsgroup.
Step 4	Read, save or print articles you find particularly interesting.
Step 5	Send e-mail to another USENET user.
Step 6	Post an article to the newsgroup.
Step 7	Clear all remaining articles in the newsgroup so they won't appear in your next USENET session.
Step 8	Select another newsgroup.
Step 9	Repeat steps 3 through 8 as desired.
Step 10	End your USENET session.

Even though it's not possible to explain how to use all of the newsreaders listed in addendum 1, a quick example using one of the more commonly encountered newsreaders on UNIX machines ("rn"), is given later in this chapter to illustrate what going through these steps is actually like.

Newsgroups ALL New USENET Users Should Read

When you first start using USENET, you should read the following two newsgroups to learn the ropes of the USENET world. The first is:

news.announce.newusers

This newsgroup contains informative articles which are posted every month to help explain the workings of USENET. Another very useful introductory newsgroup is:

news.newusers.questions

As the name suggests, this is a question and answer forum for new USENET users. If you read this group for several months, most basic questions you have about USENET that are not answered by this document will be asked by new users and answered by USENET experts.

If you want to keep abreast of changes and announcements about USENET, you should also read two additional newsgroups. The discussion group:

news.announce.important

contains announcements about USENET which are likely to be of interest to all USENET users. This group is *not* for political, commercial, or other non-USENET related announcements, no matter how important.

Another generally useful and informative group is:

news.announce.newsgroups

which is for announcements of the creation of new USENET newsgroups.

Finding Specialized Newsgroups To Which You Want To Subscribe

There are two basic strategies you can use to find newsgroups with most USENET software:

- List all group's names and select groups you want to read.

  This is a good strategy if you are just starting to use USENET, and you're not yet sure what's available, or how newsgroups are named. Although this is done automatically by some newsreaders, in other cases, you have to explicitly ask for a complete list of available groups. You may then subscribe to groups whose names interested you.

- Use the newsgroup software to search group's names for keywords.

  Search through the group's names for a particular word which you think might be in the names of groups you'd like to read. For example, using "rn", one could search for all the newsgroups whose names contained the word "mac", using the "/" command followed by the word "mac", in order to identify newsgroups dealing with Apple Macintosh Computers ("user>" precedes commands you should type; "rn>" indicates responses from the rn newsreader.)

```
user> /mac

rn> bit.mailserv.word-mac
rn> comp.binaries.mac
rn> comp.emacs
rn> comp.lang.forth.mac
rn> comp.os.mach
rn> comp.sources.mac
rn> comp.sys.mac
rn> comp.sys.mac.announce
        ... (many more "comp.sys.mac" groups)
rn>   gnu.emacs.announce
        ... (many more "gnu.emacs" groups)
```

  If you use this method to search for newsgroups, try to use the shortest likely abbreviation for a topic (like "bio" instead of "biology"), and/or scan the master list of USENET groups to get an idea what a likely abbreviation might be. However, some abbreviations may be redundant and refer to two or even multiple discussions groups. In this example, the word "mac" is also contained in newsgroup names which have nothing to do with Macintosh computers, like "comp.os.mach," and "gnu.emacs.bug."

Helpful Strategies For Reading Newsgroups

Your First USENET Session

As was mentioned in the introduction, each USENET site may subscribe to hundreds of groups which together may contain tens of thousands of articles. Unfortunately, many newsreaders overwhelm the first-time user by presenting every newsgroup, one by one. This approach is like teaching someone to find books in a library by presenting each book in the library in order, and asking, "Is this the book you want? No? Is the next book on the shelf what you want?"

There are a number of steps you can take to make your introduction to USENET encouraging, not intimidating. Most importantly:

Start simple. Don't try to read everything. Be selective.

First, issue your newsreader's command which gives the names of all groups available at your site in a list format. You can then start exploring USENET by subscribing to one or a small number of groups that look really interesting to you.

Try reading a few articles to get an idea what the discussion in the newsgroup is like. This will allow you to become familiar with your newsreader software, and will give you a flavor of USENET discussion.

In highly active groups, there may be a backlog of hundreds of articles which you may not have time to read. Most newsreader software include commands which will erase backlogged articles. Usually a command such as "catch-up", "clear", or "mark all read," will leave you with a clean and manageably small slate.

Once you've started reading one or more newsgroups that interest you, there are a number of things you can do to make the most out of your time with USENET.

Read Periodic Postings and Frequently Asked Questions (FAQs)

Many USENET groups contain "periodic postings" which contain useful information for the new and intermediate readers of these newsgroup(s). Such postings usually appear once a month.

Periodic postings include:

- ☐ Articles explaining USENET etiquette.
- ☐ Frequently Asked Questions (FAQs); these are questions which newcomers to a particular newsgroup often ask, and which are better answered in periodic postings than in repeated individual answers.
- ☐ Things to keep in mind before posting articles to that particular newsgroup.
- ☐ Suggestions about where to find commonly needed information about the Internet generally, or USENET specifically.

You'll get a lot more out of USENET if you make a point of reading the periodic postings of the newsgroups to which you subscribe.

You can also read periodic postings by using FTP to retrieve copies from an archive of FAQs stored on a computer with the Internet address "pit-manager.mit.edu". The files are stored in the directory "/pub/usenet". Each subdirectory within this directory has the name of a newsgroup name, each of which contains the periodic postings. Here's an example of the full file name and path of such a FAQ:

```
/pub/usenet/news.announce.newusers/Answers_to_Frequently_Asked_Questions
```

If you do not have access to FTP, you can also access the archive via electronic mail. The address of the server is mail-server@pit-manager.mit.edu. The names are the same, with the "/pub/" chopped off. To retrieve the file mentioned above, you would send mail to the mail-server with the text of your message containing only:

```
send usenet/news.announce.newusers/Answers_to_Frequently_Asked_Questions
```

You can also use the send command in e-mail messages to obtain help about how to use this mail server. For example, the request strings:

```
send help
send index
send usenet/index
send usenet/news.announce.newusers/index
```

will solicit help and index information.

Following "threads" of discussion

Even when you are reading a discussion group in a very specialized subject, you will often find that there may be only a subset of articles you want to take the time to read. Most newsreaders support an automated process for following threads of discussion. Articles which are on the same topic can be located either by scanning the subjects, the articles, or even the contents of the articles.

Clearing news you don't want to read

Newsreaders also allow you to automatically erase articles on topics you don't want to read. You can also erase all articles by USENET users whose postings you have found out you don't want to read. In some cases, you can set up a "kill" file, which will clear unwanted articles for you every time you use your newsreader.

What You Should Know BEFORE You Make Your Own Postings

All of the suggestions in the e-mail etiquette section of NUSIRG apply to USENET. The document called "A Primer on How to Work With the USENET Community," as discussed later in the "FTP Archives of USENET Information" section, is a useful resource for the novice USENET reader. You are strongly encouraged to review these documents before you become an active part of the USENET Community.

The most important thing to keep in mind when sending messages to USENET is that your message may be sent to tens of thousands of machines, and read by hundreds of thousands of people. This translates to a significant quantity of computer resources, and a substantial number of accumulated person hours. All of the specific suggestions below follow from this simple fact.

- ☐ Try not to post until you've become familiar with the workings of USENET. Making a premature posting to USENET is the best way known to embarrass yourself (and your organization) in front of tens of thousands of people at the stroke of a single key!

- ☐ No matter what you're posting, be sure you are sending your message to the appropriate newsgroup, and that you have specified an appropriate "distribution." Check through your local master list of newsgroups before posting. Sometimes, it may be useful to specify more than one newsgroup. This multiple posting activity is known as "crossposting," but try not to crosspost unless absolutely necessary. Distribution refers to how widely your posting is propagated. For example, distributions available at the University of Washington include "world," "na" for North America, "pnw" for the pacific northwest, "seattle," and "uw" for the University of Washington. If your posting is only of local interest, only post it locally. For more information, read the FAQ article "Frequently Submitted Items" in news.announce.newusers.

- ☐ If you are responding to someone else's posting, it is often more appropriate to reply directly to that person with and e-mail message. Use your newsreader's command that sends mail *directly* to that user, and not to the newsgroup. If your newsreader doesn't have such a feature, identify the person's user-id and e-mail address on the "from" line of their message or in the information at the end of their posting. You can then use your computer's mail software to send them a message.

- If you are posting a response to someone else's posting, include enough of their posting in yours to provide a context for your response. Most newsreaders and e-mail programs provide a feature to do this easily. However, try to avoid including more of their posting than is necessary to get their point across.

- Sometimes a message to which you are responding has been crossposted, inappropriately, to many newsgroups. If you respond to such a message, trim down the list of crossposted newsgroups in your response to those you feel are most appropriate.

- Before you post a question, try your local resources including reference books and manuals, local User Service staff, and friends. If your question might be a "Frequently Asked Question," check either news.newusers.questions or the newsgroup's FAQ posting, if available.

- If you want to send an answer to a question, scan the rest of the submitted articles in the newsgroup before sending mail or posting. You will often find that one question may elicit an unnecessarily large number of duplicate answers in a few hours or days. Of course, if your answer is different, and/or if you are sure that the other answers offered are definitely wrong, you should go ahead and respond.

- Some newsgroups are "moderated," which means that there is a person who screens potential postings before they are put into the newsgroup. To post to moderated newsgroups, send e-mail directly to the moderator's user-id and computer. Here are some examples of moderated newsgroups.

Newsgroup Name	Moderator	Moderator's Address
news.announce.newsgroups	David Lawrence	tale@rpi.edu
news.announce.important	Mark Horton	mark@stargate.com
news.announce.conferences	Dennis Page	denny@tekbspa.tss.com

What To Do If Something Goes Wrong

Here are three common problem areas you may encounter when using USENET: you might make a mistake, someone else might submit rude or insulting postings, or newsreader software might mess up distribution of USENET articles. Here's what to do in each case.

- Suppose you've submitted a posting, but suddenly realized that you didn't want to for one reason or another. "Oh no, I've sent my question about Nepali culture to rec.sport.football by mistake!"; or "Wait a second, what I said about x is wrong!" Luckily, most newsreaders allow you to cancel a submission. Make sure you know what your newsreader's command for this is before you post. Your submission might still get to a few sites, but you can usually squelch a mistaken submission if you act quickly. In general, it's not a good idea to post a second message retracting or apologizing for a posting unless you sincerely feel you've made a grievous mistake.

- If someone posts something that obviously violates USENET etiquette, it's usually best not to get involved. There are plenty of USENET old-timers that can usually deal with the situation in a sagacious way. Unfortunately, there are also a few hot-headed individuals who sometimes turn such situations into "flame-wars," which is USENET slang for a rude, disputatious, and inappropriate argument which shouldn't be carried out in a newsgroup. Always resist the temptation to get involved in or start flame wars; there are no winners. And, in the very unlikely event that someone attacks you personally in a posting, simply ignore it; they'll usually stop. Even the most obnoxious "flamers" will usually desist when they feel that no one is paying attention. And if you keep your peace, it will be apparent to anyone reading such a posting that it is the flamer, and not you, who is of dubious character.

❑ If you have reason to think that your local newsreader or your USENET feed is malfunctioning, find out who is responsible for maintaining USENET at your site. Unless you are a USENET administrator you shouldn't post messages about local problems.

Although this may seem to have been an inordinately long introduction to a single Internet resource, USENET is an unusually rich resource. In fact, apart from e-mail, USENET is probably the most frequently Internet resource used by the bulk of Internet users.

FTP Archives of USENET Information

Archives of Information About USENET

This is a list of monthly articles posted to news.announce.newusers which provide considerably more detail on the introductory USENET topics covered in this brief overview.

Introduction to news.announce.newusers
Rules for posting to USENET
What is USENET?
A Primer on How to Work With the USENET Community
Answers to Frequently Asked Questions
USENET Software: History and Sources
Emily Postnews Answers Your Questions on Netiquette
Hints on writing style for USENET
List of Active Newsgroups
Alternative Newsgroup Hierarchies
Regional Newsgroup Hierarchies
List of Moderators
Publicly Accessible Mailing Lists, Parts I-III
List of Periodic Informational Postings
How to Create a New Newsgroup
How to Get Information about Networks
How to Create a New Trial Newsgroup
A Guide to Social Newsgroups and Mailing Lists

If you already have access to USENET, go to the introductory "newsgroup news.announce.newusers" to read them. If you do not yet have access to USENET, but do have access to the Internet, these files are available via anonymous FTP from the FTP host:

pit-manager.mit.edu

in the directory

pub/usenet/news.announce.newusers

Each of the files has the same name as in the list above, with spaces filled by the underscore character. For example, the article entitled "List of Moderators" above is stored in pit-manager.mit.edu as:

pub/usenet/news.announce.newusers/List_of_Moderators

Archives of Other Past USENET Articles

Finally, the articles submitted to most active USENET discussion groups have been archived at various locations around the world. Although there is no single repository, there are a number of large archives which you should investigate if you want to find either old USENET discussions or USENET discussion groups which your site does not receive.

Some of the larger collections of archived newsgroups can be found at the following FTP sites:

pit-manager.mit.edu
wuarchive.wustl.edu
uunet.uu.net

If you are looking for archives of a group which is not contained in these sites, you can use the Archie program (described in Chapter 6) to search for an FTP site containing the name of the newsgroup whose archive you are seeking.

A Typical USENET Session (With the Newsreader "rn")

Even if you don't use "rn", the following example should give you a feeling for what a typical USENET session involves. This is meant to capture the spirit, not the details, of using USENET.

Commands you would type are preceded by "user>" to indicate that you should type the command which follows. Responses from the newsreader software appear after "rn>". These will not appear in an actual rn session.

Step 1. To Start the newsreading software, simply type

```
user> rn
```

Most newsreaders will respond with a series of informative messages, and a list of a few basic commands including how to get on-line help.

```
rn> Trying to set up a ".newsrc" file--running newsetup...
rn> Creating .newsrc in /u2/user-id.
rn> Done.
rn> To unsubscribe to groups use the "u" command.
rn> To list groups you can subscribe to use the "l" command.
rn> To subscribe to a newsgroup use the "g" command.
rn> Type h for help at any time while running rn.
rn> (Revising soft pointers--be patient.)
rn> Unread news in news.announce.important        11 articles
rn> Unread news in news.announce.newsgroups       132 articles
rn> Unread news in news.announce.newusers         45 articles
rn> Unread news in news.newusers.questions        85 articles
```

```
       ...etc.
rn> 11 articles in news.announce.important--read now? [ynq]
```

Step 2. Select a newsgroup to read.

The "[ynq]" prompt offers you some possible responses to the question "read now?" (y = yes, n = no, q = quit). In this and most other cases, though, you can still issue other commands. At this point, we will go to another newsgroup by typing "g" followed by the name of a newsgroup. In other newsreaders, you might use an arrow cursor, a mouse or a function key to obtain the same result.

```
user> g news.announce.newusers
rn>   Group news.announce.newusers -- subscribe? [yn]
user> y
rn>   20 articles in news.announce.newusers--read now? [ynq]
```

Step 3. To display the subjects of articles in a newsgroup, in "rn," you'd type the "=" sign.

```
user> =

rn>   286 Introduction to news.announce
rn>   287 Rules for posting to USENET
rn>   288 What is USENET?
rn>   289 A Primer on How to Work With the USENET Community
rn>   290 Answers to Frequently Asked Questions
     (etc..)
```

Step 4. To read an article whose title interests you in "rn" simply type the article's number as shown in the column of numbers in the list above.

```
rn> What next? [^Nnpq]
user> 290
```

You'll then see the first page of the article you've requested. Each article begins with a header much like a standard e-mail header, and other header lines unique to USENET articles:

```
rn> Article 290 (19 more)        in news.announce.newusers (moderated):
rn> From:                        spaf@cs.purdue.EDU (Gene Spafford)
rn> Subject:                     Answers to Frequently Asked Questions
rn> Message-ID:                  <15398@ector.cs.purdue.edu>
rn> Date:                        25 Jul 91 23:15:55 GMT
rn> Organization:                Dept. of Computer Sciences, Purdue Univ.
rn> Lines:                       674
rn> Supersedes:                  <14694@ector.cs.purdue.edu>
rn> Original-from:               jerry@eagle.UUCP (Jerry Schwarz)
rn> [Most recent change:         23 Jul by spaf@cs.purdue.edu (G. Spafford)]
rn>
rn>                              Frequently Submitted Items
rn>
rn> This document discusses some questions and topics that occur
rn> repeatedly on USENET.  They frequently are submitted by new
rn> users, and result in many follow-ups, sometimes swamping groups
rn> for weeks.  The purpose of this note is to head off these
```

```
rn> annoying events by answering some questions and warning about
rn> the inevitable
rn> --MORE--(4%)
```

The article has now filled up the screen. In rn, you press the space bar, to see the next screenfull of the message.

```
user> <space bar>

rn> consequence of asking others.  If you don't like these answers
rn> let spaf@cs.purdue.edu know.
rn>
rn> Note that some newsgroups have their own special "Frequent
rn> Questions & Answers" posting.  You should read a group for a
rn> while before posting any questions, because the answers may
rn> already be present. Comp.unix.questions and comp.unix.internals
rn> are examples -- Steve Hayman regularly posts an article that
rn> answers common questions, including some of the ones asked here.
rn>
rn> This list is often referred to as FAQ -- the Frequently Asked
rn> Questions.  If you are a new user of the USENET and don't find
rn> an answer to your questions here, you can try asking in the
rn> news.newusers.questions group.
rn> --MORE--(4%)
```

You now have several options, including displaying the next page of the article, saving it to a file on your computer, or leaving the article for another within the newsgroup. In rn, to save the file you type "s" or "w" followed by the name you want to give to the copy you're saving to your computer:

```
user> s news.announce.newusers.faq
rn>   (messages and prompts about saving the file)
rn>   End of article 290 (of 305)--what next? [^Nnpq]
```

To leave a newsgroup, you type another "q". You could go to another newsgroup by typing "g newsgroup.name". To leave "rn," you type a final "q". Exiting a newsgroup reader will return you to your computer's operating system.

FOR MORE INFORMATION ABOUT USENET

For Help Using An Already Installed Newsreader

Your best bet is to use help within the newsreader software you are using. More extensive help can usually be found in help files or man pages which should be installed on your computer. If you can't find an answer to your question by consulting with online, printed, or local user services help, you can post a message to a USENET newsgroup. Of course, this is assuming your problem is not inability to post a message! Be sure to include the name and version of the newsreader you are using, and what operating system you are working with. If you don't, you either won't get an answer, or someone will snipe at you. By way of fair warning, posted questions about using USENET software raises some net-people's hackles.

Published Book

Todinao, G. 1986. "Using UUCP and USENET: A Nutshell Handbook." O'Reilly and Associates, Newton, MA.

Online Information

USENET is a particularly well-documented Internet resource. There are hundreds of FAQ files and other introductory materials to help get you started. This chapter represents a distillation of many of the "periodic postings" maintained and posted by Gene Spafford (to "news.announce.newusers"). By subscribing to a number of introductory USENET newsgroups, you will gradually learn the folkways of the USENET community, and become familiar with the many ways in which USENET can be used.

Good Introductory USENET Newsgroups

news.announce.newusers
news.answers
news.newusers.questions

ADDENDUM 1: USENET NEWSREADING SOFTWARE PACKAGES AND SOURCE INFO

This list of FTP sources for newsreader software is meant to be representative, not comprehensive. Most all of these packages can be found on many sites not listed below. Some of the best FTP sites for single-stop shopping appear to be gatekeeper.dec.com, uunet.uu.net, and wuarchive.wustl.edu. All archive sites and directory locations listed in this NUSIRG were checked for accuracy in September 1991. The actual name of the file in the indicated directory may not precisely correspond to the common name of the program. Some programs are stored in multiple pieces which have to be reassembled locally, and many are stored in a compressed or archived format. For example, vnews for SUN/OS in alw.nih.gov is stored as "vnews-sun4.tar.Z". For a more comprehensive or current listing of archival sites containing USENET newsreader software, try using "Archie" (described in detail in Chapter 6 of NUSIRG).

Thanks to many USENET readers for helping me collect this information!

Operating System and Program Name	**FTP site & directory or e-mail contact**	**Directory Path**
Amiga		
ann	minnehaha.rhrk.uni-kl.de	pub/amiga/UUCP
arn	ab20.larc.nasa.gov	amiga/utilities/comm/Arn068.lzh
barn	uunet.uu.net	comp.sources.amiga/volume91/news
gnews	minnehaha.rhrk.uni-kl.de	pub/amiga/UUCP
vn	uunet.uu.net	comp.sources.amiga/volume91/news
Apple Mac		
HyperNeWS	tut.cis.ohio-state.edu	HyperNeWS
	uunet.uu.net	NeWS/HyperNeWS1.4

Netnews	bitsy.mit.edu	pub/news
	cricket.bio.indiana.edu	util/mac
NewsWatcher	earth.rs.itd.umich	mac/utilities/communications
TheNews	cricket.bio.indiana.edu	util/mac
	earth.rs.itd.umich.edu	mac/utilities/communications
uAccess	info@ice.com	contact e-mail address at left

MS-DOS

pcnews	wuarchive.wustl.edu	mirrors/msdos/lan
pcrrn	ames.arc.nasa.gov	pub/MSDOS/PCRRN
	tut.cis.ohio-state.edu	pcrrn
snuz	perelandra.cms.udel.edu	src/Net/snuz
	wuarchive.wustl.edu	usenet/comp.binaries.ibm.pc/ volume12/snuz
WinVN	clvax1.cl.msu.edu	winvn.zip

NeXT

next_nn	samba.acs.unc.edu	pub/news

UNIX

Gnews	apple.com	pub/ArchiveVol1/gnu
nn	wuarchive.wustl.edu	mirrors/unix-c/usenet
	uunet.uun.net	news/nn
nnotes	uxc.cso.uiuc.edu	pub/nnotes-1.4.tar.Z
notes	uxc.cso.uiuc.edu	usenet/notes
readnews	wuarchive.wustl.edu	usenet/comp.sources.unix/volume1
	uunet.uun.net	usenet/comp.sources.unix/volume1
rn	uunet.uu.net	news/rn
rrn	june.cs.washington.edu	news
tass	bode.ee.ualberta.ca	pub/unix.Z
	plains.nodak.edu	pub/alt/tass
tin	norisc!iain@estevax.uucp	send e-mail to user-id at left
trn	gatekeeper.dec.com	news/misc
	uunet.uu.net	news
vnews	wuarchive.wustl.edu	usenet/comp.sources.unix/volume1/ *
xrn	phloem.uoregon.edu	pub/src/x11
	uunet.uu.net	packages/X/contrib

VM/CMS

NetNews	listserv@psuvm.bitnet	see LISTSERV chapter for info on how to access LISTSERVers
nnr	nnrprod@mbvm.mitre.org	send e-mail to user-id at left

VMS

Anu-News	kuhub.cc.ukans.edu	ANU_V60-3
	uunet.uu.net	news/anu-news
Newsrdr	vms.ecs.rpi.edu	newsrdr/

vnews	arizona.edu	software/vms/vnews
	uhunix2f.uhcc.hawaii.edu	pub/vms/vnews
Symbolics Lisp		
news-reader	flash.bellcore.com	pub/lispm/news-reader

Chapter 8: LISTSERV Discussion Lists

WHAT IS LISTSERV?

LISTSERV is a computer program installed on computers in the BITNET network which manages "Discussion Groups" (or "lists") for people who have shared interests.

WHAT IS A LISTSERV DISCUSSION LIST?

"LISTSERV discussion lists" (or discussion groups) are topic-oriented forums distributed by e-mail, dealing with a wide variety of topics. Once you've subscribed to a LISTSERV discussion list, messages from other subscribers are automatically sent to your electronic mailbox.

To give you an idea of just how specific the topics can be, here are the subjects of 10 of the more than 2,000 currently active LISTSERV lists:

Albert Einstein's Writings
Apple-II Computer
Ecology and the Biosphere
Fly Fishing
Funny Jokes, Funny Stories
Human Genome Mapping
Japanese Language
Ocean Drilling
Robotics
Science Fiction

You might be the only person in your entire county who'd want to read a whole newspaper every day about robots or fly fishing. But there are many people in the world who are interested in robots or fly fishing, and many of them are already communicating daily about their interests with services like LISTSERV discussion lists.

No matter where you live, you can automatically receive messages from people who are subscribed to LISTSERV groups on topics that interest you.

WHAT IS A LISTSERVER?

A LISTSERVer is a copy of the LISTSERV program installed on computers on the BITNET network. Each LISTSERVer maintains subscription lists for a number of discussion groups.

HOW DOES LISTSERV WORK?

Any time you or someone else sends an e-mail message to the LISTSERVer which manages a discussion group, that LISTSERV program automatically distributes the message to every other subscriber. LISTSERV discussion groups make it easy for you to communicate with other people about a particular topic, without having to know their user-ids or e-mail addresses ahead of time.

The LISTSERV service is like an electronic newspaper, except every "article" is sent to you separately. Both LISTSERV discussion groups and newspapers contain news and articles concerning topics in which you are interested. Both allow you to contribute messages which are distributed to other subscribers.

Subscribing to a LISTSERV discussion group is also similar to subscribing to a newspaper, except that you and a LISTSERVer communicate with e-mail, instead of postal mail. You find out what lists are available and request subscription or cancellation by sending e-mail to a LISTSERVer. A LISTSERVer uses e-mail to handle subscription information and to distribute messages to and from subscribers.

A SHORT SUMMARY OF HOW TO USE LISTSERV FROM THE INTERNET

1. Get a catalog of LISTSERV discussion groups by sending e-mail to a LISTSERVer containing the message "list global."

mail: listserv%bitnic.bitnet@cunyvm.cuny.edu
message: list global

In a few minutes, the LISTSERVer will acknowledge your request and then send a copy of the "global list."

2. Read the "global list." Each line in this list has a list's name, the BITNET address of the LISTSERVer which manages that list, and a brief description of the list's discussion topic. Here are 5 lines from a global list.

Listname	Computer Address	Brief Description
AGRIC-L	AGRIC-L@UGA	Agriculture Discussion
ALF-L	ALF-L@YORKVM1	Academic Librarian's Forum
ALLMUSIC	ALLMUSIC@AUVM	Discussions on Music
ALTLEARN	ALTLEARN@SJUVM	Approaches to Learning
APPLE2-L	APPLE2-L@BROWNVM	Apple II List

3. Select a LISTSERV group to which you want to subscribe and send an e-mail subscription request.

***** IMPORTANT! *****

The addresses in the global list are BITNET addresses. Internet must communicate through one of several BITNET-Internet "gateways." Here's how it works:

BITNET address: listserv@NODE
Gateway address: listserv%NODE.bitnet@GATE.WAY.ADDRESS

where "NODE" is the BITNET address, and "GATE.WAY.ADDRESS" is one of the following BITNET-Internet gateways:

cornellc.cornell.cit.edu *or* cunyvm.cuny.edu *or* mitvma.mit.edu

For example, to subscribe to the AGRIC-L discussion group, use the following address and command string.

mail: listserv%uga.bitnet@cunyvm.cuny.edu
message: subscribe agric-l your-full-name

4. You will receive acknowledgement of your subscription, a basic introduction about LISTSERV services, and messages from other subscribers to the discussion group.

5. To send a message to the group, send mail to the group's name at its address (using a BITNET.Internet gateway).

mail apple-2@brownvm.bitnet@mitvma.mit.edu
message Whatever it is you want to send to the group!

A SUMMARY OF BASIC LISTSERV COMMANDS

LISTSERV is a computer program, so it only understands certain commands. Everything you "say" to a LISTSERVer in your e-mail messages has to fit a precise syntax.

Here's a summary of important commands that you can send to a LISTSERVer, presented in the order in which you are likely to need them. Every one of these commands is used by putting it as a single line message in e-mail to a LISTSERVer. The LISTSERVer sends a response to you by e-mail.

☐ To see what LISTSERV groups are available:

```
list global
```

☐ To get a LISTSERV "reference card" summarizing all LISTSERV commands:

```
get refcard
```

☐ To subscribe to a LISTSERV group:

```
subscribe LISTNAME your-full-name
```

☐ To cancel a subscription to a LISTSERV group:

```
unsubscribe LISTNAME your-full-name
```

☐ To get an index of archived files about a group stored on a LISTSERVer:

```
index LISTNAME
```

☐ To get a particular file from the index list:

```
get FILENAME FILETYPE
```

For example, the list "apple-2 might have files called "apple-2 logYYMM" where "YY" is a year and "MM" is a month. In other words, "apple-2 log9109" would be the log of discussions in apple-2 for September 1991.

WHAT EVERYONE SHOULD KNOW BEFORE USING LISTSERV

LISTSERV is a BITNET Network Service

LISTSERV is one of the notable services of BITNET, a network devoted to networking of educational institutions. Although BITNET LISTSERVers are available on the Internet, use of LISTSERVer by non-BITNET users should be viewed as a special privilege, not a right. BITNET is supported by annual dues from member institutions, so if you are not at a BITNET member institution, someone else is paying for your use of LISTSERV.

Mail To the Discussion Group Is Sent To the List Name, Not to "LISTSERV"

All messages which you want other people in the discussion group to read should be addressed to the name of the list. For example

apple-2%NODE.bitnet@GATE.WAY.ADDRESS

where "NODE" is the BITNET address, and "GATE.WAY.ADDRESS" is the BITNET-Internet gateway of your choice.

All e-mail concerning subscriptions, LISTSERV help files, etc., should be addressed to the LISTSERVer:

listserv%NODE.bitnet@GATE.WAY.ADDRESS

In summary, "LISTSERV" is the user-id of a program which manages lists, and the list name is the user-id of the list which people read! Be sure you understand this difference.

This is probably the biggest source of confusion which beginner LISTSERV users encounter.

Many LISTSERV Groups Are Available Through "USENET"

Many of the more popular LISTSERV groups are available through USENET, which *is* an Internet service. For more information on USENET, and how to find out which LISTSERV groups are available, see Chapter 7 of NUSIRG.

There Are Many LISTSERVers Throughout The World

In step 1 of the previous example, you were shown how to send a message to a particular LISTSERVer, the LISTSERVer at the BITNET Network Information Center (BITNIC). Any listserv command can be sent to any computer which has the LISTSERV program. The "global list" contains the BITNET addresses of all computers which have LISTSERVers.

Many LISTSERVers Are Installed On Computers Which Are Part Of BITNET *And* The Internet

For example, the IBM 3090 at the University of Washington, "uwavm.u.washington.edu", is also directly connected to BITNET, and is known in the BITNET world as "uwavm". In such cases, you can send messages to a LISTSERVer directly without having to go through a gateway. For example, you can communicate with the LISTSERVers at UW with the following mail message:

```
mail: listserv@uwavm.u.washington.edu
```

LISTSERV Subscriptions Can Become Overwhelming

Unlike a newspaper, which is usually only delivered once a day, with all the articles in a single package, LISTSERV discussion groups send every article by itself to every subscriber of the discussion group. Some LISTSERV groups are very active, and can send 10's if not 100's of messages to your electronic mailbox every day.

If you've ever subscribed to two or more newspapers, you know how quickly last weeks and last months issues can pile up. Now imagine that instead of a single issue of each newspaper each day, you had to separately handle every single article from every newspaper every day!

This is one of the main drawbacks to the LISTSERV system. If you're subscribed to several LISTSERV discussion groups, and don't check you electronic mailbox for a couple of days, you might find several hundred mail files from LISTSERVers waiting for you. Reading all of these files, or even deleting them all, can take hours of your time. If you are using a small computer system, the impact on your computing and disk resources could be substantial, even disastrous.

FOR MORE INFORMATION ABOUT LISTSERV

The best sources of information about LISTSERV LISTSERVers and the people who subscribe to LISTSERV groups.

To get LISTSERV help files and other information, send one of the following commands to the LISTSERVer of your choice.

Command	What You Will Get
get info filelist	a list of all LISTSERV files on that LISTSERVer containing LISTSERV help
get tools filelist	a list of useful LISTSERV tools for the LISTSERV program (such as LISTDB which is a very powerful database program) for searching LISTSERV log files for information)
help	a brief list of LISTSERV commands
info refcard	an expanded list of LISTSERV commands

index	a list of all files stored on that LISTSERVer
list global	a list of all lists known to that LISTSERVer

SECTION 4: KNOWLEDGE AT YOUR FINGERTIPS

Information Services on the Internet

By now, you are probably aware that many of the services mentioned in Sections 2 and 3 of NUSIRG are tremendous sources of information: FTP file archives contain a wealth of computer programs and documents, and many USENET and LISTSERV groups are filled with useful and informative discussion.

Section 4, however, is devoted to more formal and highly structured sources of information, such as library catalogs and databases.

ELECTRONIC JOURNALS

Electronic journals are essentially like printed magazines, except they are distributed as computer files in a network.

ELECTRONIC BOOKS

Electronic books, or e-texts, are essentially the electronic equivalents of regular printed books.

ONLINE PUBLIC ACCESS CATALOGS (OPACS)

OPACs are network accessible library catalogs which you can browse from your own computer.

ONLINE DATABASES AND BIBLIOGRAPHIES

These services allow you to access databases which you can use for research or education.

WIDE AREA INFORMATION SERVER (WAIS)

WAIS is an example of a "database of databases" which can pull together diverse information services available on a network into one easy-to-use service. Applications like WAIS are likely to become essential tools for quick and easy access to the wealth of information stored in computer networks.

NETWORK DIRECTORY SERVICES

These services allow you to locate people and computers on a network, much like you would use "white pages" or "yellow pages" to find the phone numbers of people and services.

Chapter 9: Electronic Journals

WHAT ARE ELECTRONIC JOURNALS?

"Electronic journals" are the computer network equivalent of printed magazines in form and function. They usually feature submitted articles, which are screened and edited to a common format, and often deal with a relatively broad topic. "Electronic newsletters" are usually shorter, more specific, and, as the name would suggest, more oriented towards news and announcements.

WHAT KINDS OF ELECTRONIC JOURNALS ARE AVAILABLE?

There are a wide variety of electronic journals and newsletters which, just like printed magazines, range from the mainstream to the esoteric.

Some electronic journals are nearly indistinguishable from formal and scholarly printed journals of learned societies. These journals are published only after rigorous "peer review" and articles accepted for publication focus on the leading concerns of established academic disciplines. Other journals are considerably more informal and contain a wide variety of articles of general interest.

The documents listed in the "For More Information Section" provide comprehensive and up-to-date listings of the many electronic journals and newsletters which are available.

HOW TO SUBSCRIBE TO ELECTRONIC JOURNALS

To get regular printed magazines, you can subscribe and have each issue sent to you by mail, or you can go to a newsstand to pick up each issue individually.

Obtaining electronic journals works in essentially the same way, except everything is done from a computer on the Internet.

1. You can send a subscription request and receive each issue via electronic mail

2. You can obtain current or old issues via FTP, LISTSERVers, or mail-servers

Here's an example of how to subscribe to an electronic journal known as "The Electronic Journal of Communication / La Revue Electronique de Communication," a bilingual, quarterly journal devoted to communication theory, research, practice and policy.

Address an e-mail message to:

```
comserve@vm.ecs.rpi.edu
```

containing the message:

```
join ejcrec your full name
```

e.g.:

join ejcrec Jane Q. Public

Note that this subscription request, as is the case with many subscription requests, will be processed by an electronic mail server - a computer program which only understands a certain limited and specific set of commands (for more information on electronic mail servers, refer to Chapter 3 of NUSIRG).

The information you will need to subscribe to or obtain back issues of most available electronic journals are provided in the documents listed below.

FOR MORE INFORMATION ABOUT ELECTRONIC JOURNALS

If you want to subscribe to electronic journals, you should get a copy of the document entitled "Directory of Electronic Journals, Newsletters, and Scholarly Discussion Lists," published by the Association of Research Libraries.

This directory currently lists over 500 scholarly lists, about 30 journals, over 60 newsletters, and 15 "other" titles including some newsletter-digests and specific instructions for obtaining each publication by mail or via FTP.

Electronic copies of this directory are currently available from the following LISTSERVers:

listserv@brownvm.brown.edu
listserv%uottawa@vm.utcs.utoronto.ca

Filenames (notice the spellings!):

ejournl1 directry
ejournl2 directry

Example Syntax:

```
mail:       listserv%uottawa@vm.utcs.utoronto.ca
subject:    (none necessary)
message:    get ejournl1 directry
```

If you want to purchase a bound book version of this information, contact:

Office of Scientific & Academic Publishing
Association of Research Libraries
1527 New Hampshire Avenue, NW
Washington, DC 20036 USA

e-mail: arlhq%umdc@
phone: (202) 232-2466 or 462-7849

Chapter 10: Electronic Books

WHAT ARE ELECTRONIC BOOKS?

In the broadest sense, an electronic book is any document which is lengthy enough to be considered a book, and which is stored on a diskette, a hard drive, a magnetic tape, or a compact disk (CD).

By this definition, you are currently reading part of an electronic book, since the NUSIRG is available, in its entirety, as files from the NorthWestNet FTP archives. And, by this definition, the many computer-related manuals which are available by FTP can also be thought of as electronic books, sometimes referred to as "e-texts."

But this chapter will focus on a special class of electronic books, "classical texts" of world literature such as The Declaration of Independence, The Great Gatsby, the Bible and the Koran, the Oxford English Dictionary, or even "Hikayat Indraputra," the notable Malay romance.

HOW DO YOU USE ELECTRONIC BOOKS?

Electronic books are stored as computer files. You can read electronic books at your computer screen, print them out in plain text, and if you have access to the right hardware and software, you can often print elegantly formatted output on a laser printer.

The rest of this chapter describes each of the three current major providers of electronic books: Project Gutenberg and The Advantage Foundation, which concentrate on "popular" classics in the English language; and The Oxford Text Archives, which is a repository for hundreds of e-texts of special interest to literary scholars. The Oxford Text Archive service also features an information service to tell you about the source of many other e-texts throughout the world.

PROJECT GUTENBERG

Project Gutenberg is a not-for-profit organization whose goal is to prepare electronic editions of more than 10,000 books by the year 2001. All documents are available as text-only files, but many can also be obtained in fancy PostScript or troff formats.

As of September, 1991, the following e-texts are being distributed by Project Gutenberg:

Alice in Wonderland
As You Like It
Declaration of Independence
The Federalist Papers
The Holy Koran
Through the Looking Glass
Moby Dick
The Book of Mormon
The Hunting of the Snark
U.S. Constitution
The World Fact Book
The Night Before Christmas

Many other documents are currently being prepared by Project Gutenberg, including The Oxford English Dictionary, Paradise Lost, Peter Pan, and even the 11th Edition of the Encyclopedia Britannica.

How to Obtain Project Gutenberg E-Texts

Electronic books from Project Gutenberg can be obtained most easily by FTP or mail-server. If you don't have access to the Internet, you can purchase floppy disk versions by postal mail, but mail orders will be considerably slower for you, and more time consuming for Project Gutenberg.

FTP Hosts for Project Gutenberg E-Texts

As of September 1991, Project Gutenberg files could be retrieved from the following FTP Hosts:

1. FTP Host: quake.think.com
directory: pub/etext
filenames: alice27a.txt
as-you-like-it.text
...etc.

2. FTP Host: mrcnext.cso.uiuc.edu
directory: etext
filenames: alice26a.txt
lglass16.txt
...etc.

3. FTP Host: oes.orst.edu
directory: pub/almanac/guten
filenames: alice27a+.ms.Z
alice27a.txt.Z
...etc.

(Note that most files in this FTP Host are in compression format.)

Almanac Mail Server for Project Gutenberg E-Texts

You can also order copies of Project Gutenberg documents by sending an e-mail message to the Oregon Extension Service's Almanac Information Server:

mail: almanac@oes.orst.edu
subject: (none needed)
send guten FILENAME

where "FILENAME" is one of the following filenames

alice
koran
snark
as-you-like-it
lglass
us-const
dec-of-ind
moby
world
feder
mormon
xmas

For more information on the Almanac Information Server (which provides many other services as well), send the following e-mail message:

mail: almanac@oes.orst.edu

subject:	(none needed)
message:	send guide

For More Information About Project Gutenberg

Project Gutenberg is a not-for-profit effort which relies on volunteer assistance for submission and proofing of electronic texts, and legal issues concerning copyright law. For more information, contact:

Michael S. Hart, Director Project Gutenberg
405 West Elm St.
Urbana, IL 61801
hart@vmd.cso.uiuc.edu

THE ADVANTAGE FOUNDATION

Like Project Gutenberg, the Advantage Foundation is a not-for-profit organization concentrating on English language literature.

As of September, 1991, the following e-texts were available from The Advantage Foundation:

Common Sense
Adventures of Sherlock Holmes (Part 1)
Sherlock Holmes: A Study in Scarlet
The Adventures of Tom Sawyer
U.S. Constitution
War of the Worlds

How to Obtain Advantage Foundation E-Texts

The Advantage Foundation is not yet connected to the Internet. Files can be downloaded from an easy-to-use Bulletin Board Service (BBS) in Houston, TX, accessed via a modem call to (713) 977-9505.

Files at the Advantage Foundation are stored in compressed format (ZIP). For information on how to download and handle "zipped files," consult the passage in Chapter 4 of NUSIRG entitled "The ABC's Of Handling Special Files."

For More Information About the Advantage Foundation

The Advantage Foundation
P.O. Box 773425
Houston, TX 77215
(713) 977-1719 (Fax/Voice Mail)
(713) 977-9505 (Bulletin Board Service)

THE OXFORD TEXT ARCHIVES

Unlike Project Gutenberg and The Advantage Foundation, the Oxford Text Archives is oriented towards e-texts of special interest to literary scholars. It contains hundreds of e-texts in many different languages. Many of the e-texts contained in this archive either have to be purchased, or have restrictions on their distribution and use.

Nonetheless, this is a truly extraordinary resource which deserves your interest. Here is a very brief excerpt from The Oxford Text Archives' large holdings to give you a feeling of the wealth and variety of materials that are available from this source:

A la Recherche du Temps Perdu
Arabic Prose Samples.
Aristotle, Complete Works (in Greek)
Beowulf
Blues Lyric Poetry: An Anthology
British Columbian Indian Myths
Chinese Telegraphic Code Character Set
Das Nibelungenlied
Etymological Dictionary of the Gaelic Language
Genji Monogatari
Hamlet
Hikayat Indraputra (a Malay Romance)
Homer, Complete Works (in Greek)
Hyckerscorner. Wynkyn de Worde
Il paradiso, Il purgatorio, L'Inferno
Llyr gwyn Rhydderch: Ronabwy
MRC Psycholinguistic Database
Orwell's "1984" (in Croatian)
Plato, Collected Works (in Greek)
The Aeneid
The Origin of Species

Another extraordinarily valuable service of The Oxford Text Archives is a database of information about e-texts available from other archives around the world!

How To Access The Oxford Text Archives

Direct network access to The Oxford Text Archives is currently only possible from within England via the JANET Network:

FTP Host: uk.ac.ox.vax
file: [archive].snapshot.lis

Access from the Internet in the United States via the Internet-Janet Gateway (TELNET to sun.nsf-relay.ac.uk) may be possible by time you read this guide. For more up-to-date information on this gateway service, send an e-mail message with the following two lines of text in the body of your message:

mail: info-server@nsfnet-relay.ac.uk
subject: (none needed)
message: Request:janetpad

Topic: userguide

For More Information About The Oxford Text Archives

The definitive U.S. FTP host for information about the Oxford archives is:

FTP Host:	ra.msstate.edu	
directory:	pub/docs/history/e-documents	
files:	oxford.text.archives	(general description)
	oxford.text.order.form	(how to get e-texts)

You can also contact the archives by postal mail or e-mail. E-mail inquiries will, in general, be processed much more quickly.

Oxford Text Archive
Oxford University Computing Service
13 Banbury Road, Oxford OX2 6NN, UK
e-mail: archive@vax.ox.ac.uk

FOR MORE INFORMATION ABOUT ELECTRONIC BOOKS

This is a rapidly growing area, and by the time you read this, there may be many additional providers of electronic books other than the three discussed in this document:

1. The Oxford Text Archives maintains a database of information about e-texts available from many other archives around the world:

Oxford Text Archive
Oxford University Computing Service
13 Banbury Road, Oxford OX2 6NN, UK
e-mail: archive@vax.ox.ac.uk

2. The following discussion group is currently mostly for and about Project Gutenberg, but it also a forum for discussion about the many issues (legal, pedagogical, etc..) concerning e-texts generally.

Listserv Discussion Group

mail:	listserv%uiucvmd.bitnet@uiucvm.uic.edu
subject:	(none needed)
message:	subscribe gutnberg YOUR-FULL-NAME

USENET Newsgroup (cross-posting of the Listserv Discussion Group)

bit.listserv.gutnberg

Chapter 11: Accessing Library Catalogs Through The Internet

> *The library was laid out on a plan which has remained obscure...only the librarian has received the secret, and he communicates it, while still alive, to the assistant librarian...only the librarian has, in addition to that knowledge, the right to move through the labyrinth of the books, he alone knows where to find them and where to replace them...The other monks may know the list of the volumes that the library houses; only the librarian knows, from the collocation of the volume, from its degree of inaccessibility, what secrets, what truths or falsehoods, the volume contains...a spiritual labyrinth, it is also a terrestrial labyrinth...*
>
> Umberto Eco
> *The Name of the Rose*

Hundreds of the world's best libraries are now accessible to anyone connected to the Internet. Access to most of these libraries is completely free, and usually available any time, day or night, from anywhere in the world.

Over the past decade, many libraries have started putting their card catalogs into computer databases that can be used with "online library catalogs" or "online public access catalogs" ("OPACs").

Using an OPAC is essentially just like using a card catalog. The only difference is that instead of pulling drawers and riffling through cards, you login to an OPAC from a computer, and search the catalog by typing the key words on which you want to base your search. No matter how small your local or institutional library is, information about tens of millions of books and articles is now at your fingertips. Thus, it's easy to understand why OPACs are a significant and extremely powerful development in access to information.

WHAT YOU CAN DO WITH ALL OPACS

- ☐ Search for books by subject, title, or author.
- ☐ Obtain detailed bibliographic information about the books found by your search.
- ☐ If you are accessing an OPAC from your own mainframe account or a personal computer, you can save the on-screen results of your searches to your own computer for local use. (For example, the program, 'script' in UNIX will save what appears as output to your screen to a file. Type "man script" to get more information.)

ADDITIONAL SPECIAL FEATURES OF SOME OPACS

In addition to the basic subject/title/author searches, many OPACs allow you to do one or more (or even all) of the following:

- ☐ read brief summaries of books or articles,
- ☐ search for articles from newspapers and/or journals,

- search catalogs of special collections: CDs, videos, movies, photographs, maps, microfilm, and phonographs,
- search special databases,
- do searches by other variables, such as "keywords,"
- construct pin-point searches with the logical operators AND, OR, and NOT, or other specialized searching functions,
- determine if a book is currently checked out,
- set up inter-library loans,
- if there are multiple copies of a book in various branch libraries served by the OPAC, find the location of the nearest copy, and
- record results of your search and send them instantaneously (or by e-mail) to your own computer for local use.

What You Can't Do (Yet) With OPACs

- read the actual text of documents or
- browse randomly through the library's shelves, encountering books, that by chance, may turn out to be tremendously interesting for current or unanticipated interests. (Thus OPACs currently do not foster the "serendipity effect.")

Essential Guides for Using OPACs

If you are planning to use OPACs through the Internet, you will find the following two documents very useful. These documents provide detailed access and descriptive information about the rapidly growing number of OPACs you can access through the Internet. Both of these sources are available from many FTP hosts throughout the Internet; the hosts listed are the definitive repositories for these documents, and will always have the most up-to-date editions.

1. "Internet Accessible Library Catalogs & Databases," by Art St. George and Ron Larsen.

FTP Host:	nic.cerf.net	
Directory:	cerfnet/cerfnet_info	
Files:	internet-catalogs-08-91.txt	(text only)
	internet-catalogs-04-91_apl.ps	(Apple PostScript)

Note that the filename contains the date the file was most recently updated. This may be different by the time you FTP from this archive.

2) "University of North Texas' Accessing Online Bibliographic Databases," by Billy Barron.

FTP Host:	vaxb.acs.unt.edu	
Directory:	library	(this directory contains many other useful files on OPACs)
Files:	libraries.ps	(PostScript version)
	libraries.txt	(ASCII, text only version)
	libraries.wp	(Word Perfect 5.0 version)

Run--do not walk--to your terminal, and FTP one or both of these essential resources.

EFFECTIVE USE OF ONLINE-CATALOGS (OR, "HOW TO THINK LIKE AN OPAC")

If you've never used the card catalog of a large library, you're in for a big surprise. Searches through OPACs can yield hundreds or even thousands of citations for what you might think are highly specialized topics. Searches for individual authors tend to yield manageable results. But subject searches, especially if the subject is not chosen carefully, may deposit many screen-fulls of information to your terminal.

For example, most American OPACs use Library of Congress Subject Headings which are very precise and highly structured. Subject headings which are intuitively sensible to you may not yield ANY search results, if they do not correspond precisely to an entry in the OPAC's list of subject headings. Although some OPACs will display available subjects on your terminal, it is sometimes useful to consult the "Library of Congress Subject Headings" book before beginning a large scale OPAC search. This reference is available at most libraries. There is also a "Medical Subject Headings" volume useful for services like Medline.

There are a number of things to keep in mind which will make it easier to find what you're looking for when using an OPAC.

- ☐ Start with a very specific search.
- ☐ Use special search tools, such as the logical operators AND, OR, and NOT, or wildcard symbols, if they are available.
- ☐ When you find an entry which seems to be very close to what you need, examine its subject, title, author, and keyword fields. This can help you narrow or broaden your search, and may lead you to other appropriate entries by suggesting search terms you might not have considered ahead of time.
- ☐ If one OPAC doesn't give you the reference(s) you want, try another, or consult the Barron or St. George list to see if a particular OPAC is very strong in the subject you are researching.

GETTING STARTED WITH INTERNET ACCESS OF OPACS

Here is a list of a few Internet accessible OPACs in the United States and Canada to try out.

Internet Address	Institutional Affiliation	Login Information
bootes.unm.edu	University of New Mexico	login: STUDENT1
bull.utulsa.edu	University of Tulsa	login: LIAS,TU
cts.merit.edu	University of Michigan	none
develnet.ucalgary.ca	University of Calgary	Request: library
melvyl.ucop.edu	University of California	none
nls.adp.wisc.edu	University of Wisconsin	none
pac.carl.org	Colorado Alliance of Research Libraries	none

There are hundreds of other OPACs available, so don't make these your default sites. If you decide you are going to use OPACs for teaching or research, be sure to get a copy of either or both the Barron or St. George/Larsen catalogs so you can learn about other OPACs that may be closer geographically and in areas of specialization.

A Sample OPAC Session

There are many different software packages for OPACs. To further complicate matters, some of the most widely used packages can be modified heavily by particular sites, and some sites use home grown packages which may have very peculiar features and behaviors, especially when used from remote locations via TELNET.

However, there are enough similarities between OPACs that a sample session from one should give you a fair indication of what using most other OPACs is like.

This section presents a session using the University of California's MELVYL System. Note that this session has been edited slightly to make it easier to read on a page.

This session illustrates the essential steps you'd want to take when using most any OPAC:

Step 1. TELNET to the OPAC of your choice. For OPACs using IBM based systems, use a TELNET capable of 3270 emulation (e.g. tn3270).
Step 2. Enter a terminal type. (vt100 is usually a safe bet.)
Step 3. Use online help. (Repeat as necessary.)
Step 4. Select a database within the OPAC.
Step 5. Select the degree of prompting you want from the system while doing your search (e.g., be led by the hand, or plow right through.)
Step 6. Select a search type (typically, Author, Subject, Title).
Step 7. Enter a value for the search. (NOTE: Steps 6 and 7 are often a single step in other OPACS, e.g., "SU=ENDANGERED SPECIES.")
Step 8. If necessary, redefine and/or refine your search.
Step 9. Repeat steps 3-9, in any order, for additional searches.
Step 10. Logoff and end your TELNET session.

Throughout the session, lines on which the user is prompted by the OPAC begin with a "U>". Words printed by the OPAC on the prompt line are in all uppercase. Responses typed by the user appear in lower case. As always, <RETURN> means press the RETURN key on your keyboard (or, in some cases, the ENTER key).

Note that this OPAC session is rather long - intentionally.

It would have been easy to present a quick and easy session which immediately produced references to thousands of citations. But as you probably know from your experience with regular card catalogs, effective use of a library system often requires careful consideration and reconsideration of how to define your literature search.

This OPAC session is meant to reflect this reality: the first search in this example yields no results, but by modifying the search slightly, and following suggestions from MELVYL, a very similar search yields more than 500 citations!

Step 1. TELNET to the OPAC.

To get started, TELNET into MELVYL, and then you will be prompted to provide some information about the computer from which you are working.

```
U> telnet melvyl.ucop.edu

22:13:22  Type START and press RETURN key to begin session

U> <RETURN>

Please Enter Your Terminal Type Code or Type HELP for a List of Codes.

U> TERMINAL? help

Please enter the Terminal Type Code for your terminal.

Supported Terminal Types and their character codes are:

CODE        TERMINAL                    CODE        TERMINAL

TTY33       Teletype 33 (TTY)           BANTAM      Perkin Elmer Bantam
ESPRIT      Hazeltine Esprit            ADM3A       ADM 3a
PE1100      Perkin Elmer 1100           HAZ1500     Hazeltine 1500
HARDCOPY    Decwriter/Gencom            HAZ2000     Hazeltine 2000
IBMPC       IBM Personal Computer       HEATH       Heathkit H19
KERMIT      KERMIT Emulation            VT100       Dec VT100
ACT5A       Microterm Act5a             ADDS        ADDS/NCR
HP2621      Hewlett Packard HP2621      BITGRAPH    BBN Bitgraph
TI700       TI Silent 700               TTY40       Teletype 40 (TTY)
TELE920     Televideo 910, 912, 920     DISPLAY     IBM Displaywriter
TANDEM      Tandem 635X                 OTHER       All Others

Please Enter Your Terminal Type Code or Type HELP for List of Codes.
```

Step 2. Enter a terminal code.

"Terminal type" does not mean "is your computer a Macintosh or an IBM mainframe?" but rather "what kind of terminal can your computer 'emulate'?" Any particular computer can, depending upon installed software, emulate one or more terminal types.

With some TELNET services, you can ask for a display of the terminal types supported by that particular service. The list displayed by MELVYL includes VT100, a kind of "full screen" terminal emulation very frequently included in personal computer and mainframe telecommunication software packages.

If you're not sure what kind of terminal emulation your computer is using, many OPACs and other TELNET services allow you to use a "dumb" terminal type which performs the most basic "teletype" functions. In MELVYL, the dumb terminal type is called "other," which is what we'll use for this sample session.

```
U> TERMINAL? Other

Press RETURN for the MELVYL Catalog U

U> <RETURN>

                    Welcome to the University of California's

                           MELVYL* LIBRARY SYSTEM

          (c)1984. *Registered trademark of The Regents of the University

                               of California.

OPTIONS:  Choose an option, or type any command to enter the CATALOG database.

HELP            For help in getting started.
[return]        Press RETURN to choose a database for searching.
START <db>      Type START <database name> to search a database.
```

Step 3. Investigate the online help.

Notice that at the end of step 2, MELVYL offered help in getting started. You can save a great deal of time and make better use of online resources if you investigate any help that might be offered. In MELVYL, the "help" command can be used to display what options are available at certain points during your session.

```
U> help

The options for proceeding are:

[return]            Press RETURN to see the list of MELVYL system databases.
                    You may then choose a database to search.
START <db>          If you already know the name of the database you want to search, type
                    START and the database name, e.g., START CC.
Any command         By typing any other valid command, e.g., FIND or EXPLAIN, you will
                    enter the CATALOG database.

U> <RETURN>
```

In the last screen we've pressed the RETURN key which yields a display of MELVYL catalogs.

```
                         MELVYL SYSTEM DATABASES

                    Select one database from the list below.

Library Databases:

TEN     For faster searches, type TEN;
        Ten-Year MELVYL Catalog; materials published from 1981-1991.
CAT     Full MELVYL Catalog - UC libraries and California State Library.
PE      Periodical Titles - Calif. Academic Libraries List of Serials.

Journal Article Indexes:  (for UC users only; password may be needed)

CC      CURRENT CONTENTS          current articles in all subject areas.
CCT     CURRENT CONTENTS          journal tables of contents in all subjects.
MED     MELVYL MEDLINE            articles in medical and life sciences.

Other Systems:

OTHER          To select other library catalogs and remote information systems.

Shortcut:      type any command to enter the CAT database (e.g., FIND or EXPLAIN)

Type the code for one option (e.g., TEN), HELP, or END to end your session.
```

Step 4. Select a database within the OPAC.

For this session, we'll use the MELVYL Ten-Year database, which only includes materials published in the last 10 years. Notice that MELVYL's holdings for this brief period includes more than 1.5 million distinct titles!

```
U> start ten

Command being issued: START TEN

               Welcome to the MELVYL TEN-YEAR Catalog Database

Contents:      As of 9/8/91, approximately 1,580,596 titles representing 3,578,900
               holdings, for materials in the University of California libraries,
               and the California State Library,
Coverage:      Publication dates 1981 through 1991.
OPTIONS:       Type an option and press RETURN, or type any command.
HELP           For help in getting started.
COMMAND        To use commands and for periodicals; use any time.
LOOKUP         For Lookup Mode--the system leads you through commands.
START          To start over or change databases.
END            To end your session.
```

Step 5. Select what degree of prompting you want from the system.

Many interactive Internet services allow you to tailor sessions to your level of expertise, ranging from step-by-step help for new users, to a nearly blank screen for expert users. The information presented in the previous screen indicates that one can type "lookup" for extensive prompting.

```
U>  TEN -> lookup

                 Welcome to Lookup Mode in the TEN-YEAR Catalog Database

You can start searching without learning the command language by following the prompts
below.  You will see the appropriate commands used for your search.

At any time, you can also type:

SET MODE COMMAND            to change to Command Mode.
START CAT                   to change to the full CATALOG database.
END                         to end your session.

Press RETURN to begin.

U> TEN -> <return>
```

Now let's go back to the Ten-Year catalog, and continue with step-by-step help.

```
In Lookup Mode, you can search for books at the following libraries:

Code    Library                           Code    Library
ALL     All libraries in MELVYL           CAS     California Academy of Sci.
UCB     Berkeley; includes MOF,           CRL     Center for Res. Libraries
MOF     UCB Moffitt Undergrad. Lib.       CSL     California St. Lib.; incl.
UCD     Davis and UCD NRLF                        Sutro Lib., S.F., CSL NRLF
UCI     Irvine and UCI SRLF               HAS     Hastings Law Library
UCLA    Los Angeles; includes COL         LBL     Lawrence Berkeley Lab
COL     UCLA College Undergrad. Lib.      LAW     UC Law: UCB UCD UCLA HAS
UCR     Riverside                         MED     UC Med. libraries.: UCD
UCSD    San Diego; includes SDU                   UCI, UCLA,UCSD, UCSF
SDU     San Diego Undergrad. Lib.         NOR     North UC libs.: UCB, UCD,
UCSF    San Francisco and UCSF NRLF               UCSC, UCSF, HAS, LBL
UCSB    Santa Barbara                     SOU     South UC libs.: UCI, UCLA,
UCSC    Santa Cruz and UCSC NRLF                  UCR, UCSB, UCSD
                                          UC      All, except CAS CRL CSL

Type the code for your library or type ALL for all libraries in the catalog, then press
RETURN. You can type up to 4 codes. Type HELP for more information.
```

We've been asked which library we want to use; in this sample session, we'll search through all of the University of California libraries.

```
U > TEN -> all

Welcome to Lookup mode.

You can search for books by:

-the name of the person who wrote the book              (Personal Author)
-by the title of the book                               (Title)
-or by the Subject headings assigned to the book        (Subject)

Type          for one of the following choices:
PA            Personal Author search
SU            Subject search
TI            Title search
HELP          More information on choices
END           End your session.
```

Step 6. Select a search type.

Now we'll indicate that we want to search through the catalog by subjects (type "su"):

```
U> TEN -> su

Type SUBJECT heading words,  or type HELP,  then press RETURN.

U> TEN -> help

You have selected the SU index.

A subject may be a topic, a geographic place, or a person.

Ask a reference librarian for "Library of Congress Subject Headings" or for "Medical Subject
Headings,"   to help identify an official heading to use in your subject search request.

Try to be as specific as possible; otherwise you will retrieve more books than you can look at
easily.  For example, typing the words MARINE BIOLOGY PACIFIC OCEAN is more
specific than typing BIOLOGY.

If you do not find the books you want, try repeating your search as  a title search or ask a
librarian for assistance.

Type SUBJECT heading words, then press RETURN.
```

Step 7. Enter a value for the search.

Now we can enter a subject; let's try "extinction of species" which we'll abbreviate as "extinction species":

```
U> TEN -> extinction species

Command being processed: FIND SU EXTINCTION SPECIES

Search request: FIND SU EXTINCTION SPECIES
Search result:  0 records in the TEN-YEAR Catalog database
Please type HELP for information on zero search results.

Since your Subject search had zero results, you might want to try your search again as a Title
Word (TW) search using 2 or 3 significant words.  Please type HELP for more information on
zero results.

Type choice,  or type END to end session:

TW     Title Word search                      PA     New Personal Author search
TI     New Title search                       SU     New Subject search

Or type START CAT LOOK to leave the TEN-YEAR database and try your search in the full
CATALOG database.

U> TEN -> tw
```

No books were found with a request using "extinction species" as our subject. But don't give up yet! MELVYL now allows the option of doing another search by several other fields, including the words in the book's titles (TW). Let's try another search, looking for books which have the words "species" and "extinction" in their titles:

```
Type 2 or 3 important words from the TITLE of the book you want, or type HELP, then press
RETURN.

U> TEN -> extinction species

Command being processed: FIND TW EXTINCTION SPECIES
```

The search string "extinction species," which did not find anything during a subject search, locates 13 relevant titles with a Title Word search.

```
Search request: FIND TW EXTINCTION SPECIES
Search result:  13 records in the TEN-YEAR Catalog database

1. Balancing on the brink of extinction : the Endangered Species Act and lessons for the
future / edited by Kathryn A. Kohm.

Washington, D.C. : Island Press, c1991.
UCB          BioSci       KF5640                 .B35      1991
UCD          Main Lib     KF5640                 .B35      1991
UCI          Main Lib     KF5640                 .B35      1991
UCSC         McHenry      KF5640                  B35      1991
UCSD         Scripps      KF5640 .B35 1991       Floor 3
CAS          Mailliard    KF5640                 .B35      1991

Type choice,  or type HELP for help, END to end session:

NS      Next screen of Short display      PA      New Personal Author search
SHO     Different records in Short        SU      New Subject search
LON     Long display                      TI      New Title search
REV     Review display

U> TEN -> ns
```

You can keep browsing through this short display by typing "ns".

```
Search request: FIND TW EXTINCTION SPECIES
Search result:  13 records in the TEN-YEAR Catalog database

2. Cohn, Jeffrey P.
The politics of extinction : [endangered species] / by Jeffrey P. Cohn.
IN:  Government executive. Vol. 22, no. 10 (Oct. 1990)
UCB          IGS          R.R.

Type choice,  or type HELP for help, END to end session:

NS      Next screen of Short display      PA      New Personal Author search
SHO     Different records in Short        SU      New Subject search
LON     Long display                      TI      New Title search
REV     Review display

U> TEN -> rev
```

Alternatively, MELVYL allows us to review all of the titles retrieved by our search request. When we type "rev"; the display looks like this:

```
1.  Balancing on the brink of extinction : the Endangered .... 1991
2.  COHN, Jeffrey P.                  The politics of extinctio ... 1990
3.  EHRLICH, Paul R.                  Extinction : the causes a ... 1981
4.  EHRLICH, Paul R                   Extinction : the causes a ... 1983
5.  KELLY, Donald M.                  Near extinction : Califor ... 1990
6.  LABASTILLE, Anne.                 Mama Poc : an ecologist's ... 1990
7.  MYERS, Norman.                    Tackling mass extinction  ... 1986
8.  The Road to extinction : problems of categorizing the .. 1987
9.  The Road to extinction : problems of categorizing the ...1987
10.  Australia's endangered species : the extinction dilemma. 1990
11.  AUSTRALIA. Endangered Species Advisory Committee.
        An Australian national strategy for the conservatio...1989

Type the numbers of the records you want to see in a LONG display, or type HELP.

To see all the records, simply press RETURN.

        U> TEN -> 1
```

Now let's ask for a "LONG" display of item number 1 to see if it provides any clues about how we might refine the search.

```
Search request: FIND TITLE WORDS EXTINCTION SPECIES
Search result:  11 records in the TEN-YEAR Catalog database

1.
Title:          Balancing on the brink of extinction : the Endangered Species Act and
                lessons for the future / edited by Kathryn A. Kohm.  Washington, D.C.
                :Island Press, 1991.
Description:    xi, 318 p. : ill., maps ; 24 cm.
Notes:          Includes bibliographical references and index.
Subjects:       Endangered species -- Law and legislation -- United States.
Other entries:  Kohm, Kathryn A.
                (Record 1 continues on the next screen.)

Type choice,  or type HELP for help, END to end session:

NS      Next screen of Short display      PA      New Personal Author search
SHO     Different records in Short        SU      New Subject search
LON     Long display                      TI      New Title search
REV     Review display
```

As you can see by looking at the subject line, this book is cataloged under the subject "endangered species."

Step 8. Redefine and/or refine your search.

Judging by the other titles in the list in Step 7, it appears that a subject search for "endangered species" will very likely be fruitful.

```
U> TEN -> su endangered species

Search request: FIND SU ENDANGERED SPECIES
Search result:  520 records in the TEN-YEAR Catalog database

1. 1986 IUCN red list of threatened animals. 1986
2. 1988 IUCN red list of threatened animals. 1988
3. AAZPA manual of Federal wildlife regulations. 1985
4. Action plan for African primate conservation: 1986-90. 1985
5. ADAMS, Douglas, 1952-          Last chance to see. 1991
6. Alaska wildlife week unit : wildlife for the future. End... 1985
7. ALLEN, William B. 1928-        State lists of endangere... 1988
8. ANCONA, George.                Turtle watch. 1987
9. The Animal finders' directory. 1985
10. Animal genetic resources : a global programme for sustai... 1990
11. Animals and plants listed as threatened (T) or endangere... 1988
12. ARNOLD, Richard A.            Distribution, life histo... 1981
13. ARNOLD, Richard A. 1950-      Delta green gr (Elaphrus... 1985

...(followed by 507 more titles!)
```

MELVYL responds with 520 titles!

Step 9. Repeat steps 3-8, in any order, for additional searches

This is where the real power of using an OPAC starts; now that you've established a profitable search strategy and have some references upon which to base further searches, you can branch off to other related subject or title searches very easily.

Step 10. End your OPAC and TELNET sessions.

To leave MELVYL, type end:

```
U> TEN -> end

Thanks for using the MELVYL Online Catalog.
Type LOGOFF and press RETURN to terminate your TELNET session.
Press RETURN for the MELVYL catalog.

U> logoff

ELAPSED TIME = 0:11:53

END OF SESSION
Connection closed by foreign host.
```

FOR MORE INFORMATION ABOUT OPACS AND RELATED TOPICS

Essential Documents For Using OPACs

"Library Resources on the Internet: Strategies for Selection and Use"

FTP Host:	dla.ucop.edu
Directory:	pub/internet
Filename:	libcat-guide

"Internet Accessible Library Catalogs & Databases," by Art St. George and Ron Larsen.

FTP Host:	cerf.net.edu	
Directory:	cerfnet/cerf_net/	
Files:	internet-catalogs-08-91.txt	(text only)
	internet-catalogs-04-91_apl.ps	(apple.PostScript)

Note that the filename contains the date the file was most recently updated.

"OPACs in the UK: A list of interactive catalogues on JANET compiled for the Janet User Group for Libraries"

FTP Host:	vaxb.acs.unt.edu	
Directory:	library	
Files:	uk.lib	(ASCII text)

"University of North Texas' Accessing Online Bibliographic Databases," by Billy Barron.

FTP Host:	vaxb.acs.unt.edu	
Directory:	library	(this directory contains many other useful files on OPACs)
Files:	libraries.ps	(PostScript version)
	libraries.txt	(ASCII, text only version)
	libraries.wp	(Word Perfect 5.0 version)

Online Discussion Groups and Mailing Lists

1. As of September, 1991, there are at least 60 online discussion groups dealing with OPACs and related issues of information sciences. They range in coverage from discussion of a specific site's OPAC installations, to general discussion of present and future OPAC technology.

A comprehensive and up-to-date list of these groups is included in the "Directory of Scholarly Electronic Conferences," by Diane K. Kovacs of Kent State University, available via FTP:

FTP Host: ksuvxa.kent.edu
Directory: files are all in root directory, no need to cd
Files: ACADLIST.FILE1
ACADLIST.FILE2
ACADLIST.FILE3
ACADLIST.FILE4
ACADLIST.FILE5
ACADLIST.FILE6
ACADLIST.INDEX
ACADLIST.README.

As of September 1991, the "Libraries and Information Sciences" entries of the list are in the file ACADLIST.FILE2. However, you might as well get all 8 files; this is a tremendous resource, with information from many separate places put together in one large document in an easy to use structure.

2. NNSC Internet Resource Guide, "Chapter 2: Library Catalogs." As of September, 1991, about 30 libraries and library systems are described. Although these entries are largely rendered obsolete by the Barron and St. George /Larsen catalogs, they are still useful sometimes for supplemental information.

For all of Chapter 2:

FTP Host: nnsc.nsf.net
Directory: resource-guide
Files: chapter2-ps.tar.Z (compressed and tarred PostScript)
chapter2-txt.tar.Z (compressed and tarred ASCII text)

To obtain individual sections of Chapter 2, first FTP the Chapter 2 table of contents, and then FTP individual sections as desired:

FTP Host: nnsc.nsf.net
Directory: resource-guide/chapter.2
Files: intro.ps (PostScript table of contents)
intro.txt (ASCII text table of contents)
section2-1.ps (PostScript of section 2.1)
section2-1.txt (ASCII text of section 2.1)
(etc.) (etc.)

Chapter 12: Internet Accessible Databases and Bibliographies

WHAT IS INCLUDED IN THIS CHAPTER

This document gives information on how to access many of the computers on the Internet which contain large databases.

Of course, most computers contains large amounts of data. But in this chapter, databases are defined as "any highly structured repository of information whose contents you can access for your own analyses."

This chapter is organized by major topics, so you can quickly and easily identify sources useful to your purposes.

WHAT IS NOT INCLUDED HERE, AND WHERE TO FIND IT

- ❏ Online "White Pages" and "Yellow Pages" services which allow you to find individuals and organizations on the Internet are not included. Detailed descriptions of such services can be found in Chapter 14, "Internet Directory Services."
- ❏ Databases and information services which require special accounts on private computers, cost money to use, or can be purchased for local use are not included. Exceptions include a few "for fee" databases, in areas where free databases are not yet readily accessible.
- ❏ Many universities are currently implementing campus-wide information services. Although these information services are often treated as databases, they are usually used as directory services.
- ❏ In most of the NUSIRG, you have been provided with sample scripts to provide assistance or instruction in using a particular kind of resource. When there were a number of styles of user interface, our description focused on either a generic or common example. Unfortunately, there is such a tremendous variety of interfaces for these databases that a sample session would be of little value.

DATABASES OF DATABASES

It is possible that the Babel of databases interfaces will be rendered accessible through "databases of databases." In particular the Wide Area Information Service (WAIS) being developed by Thinking Machines Incorporated, has a great deal of promise for making a wide variety of Internet information services accessible through a single, easy-to-use interface. See Chapter 13 for more information about WAIS.

WHAT YOU NEED TO USE INTERNET DATABASES

- ☐ A computer connected to the Internet; and
- ☐ An understanding of:
  - ☐ e-mail: to send mail to Mailservers which will automatically mail help files, documents, or datasets;
  - ☐ FTP: to access "file archives," and copy files to your own account;
  - ☐ TELNET: to login into computers and run programs, search databases, and run simulations which could not be done on your own local computer.

Read the appropriate chapter(s) from NUSIRG, or any other source of Internet information if any of these terms are unfamiliar to you.

ORGANIZATION OF THE CHAPTER

The entries in this chapter are organized by the following major subject categories:

Multi-Disciplinary Databases
Aeronautical Navigation
Agriculture
Area Studies
Artificial Intelligence
Astronomy / Space Science
Census (US)
Chemistry
Computer Science
Computer Software
Ecology and Environment
Education
Genetics and Molecular Biology
Geography
Government and Politics
Grants and Contracts
History
Mathematics
Music
Physics
Statistics

ORGANIZATION OF THE ENTRIES

Each entry is coded in the following format (although not all entries contain every field):

Official Acronym and Full Official Name of Database

Audience:	An estimation of who would most likely benefit from the database. Although most of these databases are not restricted in their access, not everybody would be able to use some data sets which are very large or require sophisticated processing or software.
Contents:	A brief description of contents relevant to the purposes of this chapter. Please note that many of these sources contain information above and beyond what is mentioned in this contents field.
Comments:	Additional things that you should know.
Access:	How to access the database via TELNET, FTP, mail-server, telephone, or postal mail.
Contact:	Official contact information if you have further questions user-id@internet.address name postal mail address telephone number
More Info:	Pointers to official or more detailed descriptions, publications, online discussion groups, and other useful information.

Multi-Disciplinary Databases

CULDAT--Canadian Union List of Machine Readable Data Files

Audience: Anyone

Contents: Bibliographic and descriptive information about computer readable data files held by Canadian academic and governmental data libraries and archives. There are currently 1,417 databases accessible. Sources of databases searched in a CULDAT session include:

CUSSDA:	Carleton University, Social Science Data Archive.
NAC:	National Archives of Canada.
STC:	Statistics Canada.
UADL:	University of Alberta, Data Library.
UBCDL:	University of British Columbia, Data Library.
UMISE:	University of Manitoba, Institute for Social and Economic Research.
UWOSS:	University of Western Ontario, Social Science Computing Laboratory.
WATLS:	University of Waterloo, Leisure Studies Data Bank.
YUISR:	York University, Institute for Social Research.

Access: Via Mailserver, which accepts Remote Spires (RMSPIRES) commands. Useful RMSPIRES commands to get you started include explain, find, browse, and display. For example:

To get an overview of how to use CULDAT:

mail: rmspires%ualtavm.bitnet@vm.utcs.utoronto.edu
subject: (none needed)
message: explain culdat

To get an overview of the subjects covered by CULDAT datasets:

mail: rmspires%ualtavm.bitnet@vm.utcs.utoronto.edu
subject: (none needed)
message: browse subject

Contact: abombak@vm.ucs.ualberta.ca

Anna Bombak, Data Librarian
352 General Services Building
University Computing Systems
University of Alberta
Edmonton, Alberta T6G 2H1
(403) 492-5212

National Archives Center for Electronic Records

Audience: Anyone.

Contents: An archive of 10,000 datasets, with an emphasis on U.S. Government datasets. Particularly strong in health, demographic, and social science datasets.

Access: Currently, one must order copies of datasets on magnetic tape.

Comments: By time you read this, it may be possible to obtain some or all of these datasets on floppy disks or via FTP or mail-servers. Contact CER for an update.

Contact: For more information, or a free list of 4,000 Title List of Holdings

Ted Hull
tif@nihcu.bitnet.
The Center for Electronic Records
Archives and Records Administration
Washington, DC 20408
(202) 501-5579

More Info: There is a LISTSERV group called the "Federal Electronic Data Special Interest Group:"

fedsig-l@wvnvm.bitnet@punfs.princeton.edu

Free-Net

Audience: Anyone
Contents: Many informative files on health, education, politics, recreation, technology, etc.
Comments: Free-Net is best described as an "open access community electronic information system" which, for registered users, also allows easy access to discussion groups including USENET. Free-Net uses a novel interface in which the user wanders through an "electronic city." Files are in "buildings," so for example, to get information on politics and government, one would enter the "City Hall." A rather extraordinary open access system which could be set up at other sites at very little cost. There are currently five sites using the Free-Net software, all in the mid-western United States, but many more are being established around the world as part of a not-for-profit cooperative network called "The National Public Telecommunications Network" (NPTN). When you first log in, you will be asked if you want to visit or register. Follow the instructions. As a visitor, your privileges in Free Net are restricted. If you register, you will be sent a registration packet through the mail, which you must fill out and return.

Access: TELNET to:

freenet-in-a.cwru.edu	(Cleveland)
freenet-in-b.cwru.edu	
freenet-in-c.cwru.edu	
yfn.ysu.edu	(Youngstown, OH)
tso.uc.edu	(Cincinnati, OH)
heartland.bradley.edu	(Peoria, IL)

Contact: e-mail: aa001@cleveland.freenet.edu

T.M. Grundner, Ed.D
President, NPTN
Box 1987
Cleveland, Ohio 44106
(216) 368-2733

University of Maryland Info Database

Audience: Anyone.
Contents: Data and files on the following topics: Computers, Economics, Literature, Political Science, Meteorology, Area Studies, Electronic Journals.

Comments: Files can be viewed online while using a menu driven TELNET session, or they can be copies locally by FTP. Although you can transfer files from within the interactive system, you are probably better off noting which files you want, and then copying from the FTP host.

Access: For interactive sessions (highly recommended for browsing).

TELNET: info.umd.edu
User Name: INFO

FTP Host: info.umd.edu
directory: info

Aeronautical Navigation

NOAA Aeronautical Charting Data Sampler II

Audience: Anyone, but the files are huge, and require extensive handling. Not recommended for trivial purposes.

Contents: HUGE files containing data on the following:

1. Aeronautical Chart Automation Section (ACAS) data files (containing data on 17,000 airports, 21,000 runways, 46,000 obstructions to air navigation, navigational aid data, and ARTCC data for low and high air routes);
2. COMPSYS Distance and Bearing Software (used by National Airspace System for computing reporting points, intersections, and other fixes);
3. Special Use Airspace Data Files (used to inform pilots of restricted and prohibited airspace);
4. Advanced Automation System (AAS) Data.

Comments: NOT TO BE USED FOR NAVIGATION! For learning only. For MS/DOS computers only. Requires at least 120 Mb hard drive. These data, and the associated programs are from a CD-ROM. If you have a CD-ROM reader, you are probably better off obtaining the CD than using the FTP'able data.

Access: Accessible by FTP.

FTP Host: hobbes.ksu.ksu.edu
Directory: pub/noaa

Files:	instal.bat	(a DOS batch file for installation
	data/*.*.*	(10Mb compressed 62Mb uncompressed
	noaa/*.*.*	(12Mb compressed 36Mb uncompressed
	instal/*.*	(1Mb)

Contact: This contact information is for the CD-ROM, not the FTP'able dataset.

CD-ROM Project Director, Requirements & Technology Staff
NOAA, National Ocean Service
6010 Executive Blvd., Room 1022, N/CG3x22
Rockville, MD 20852
(301) 443-8323

More Info:

FTP Host: hobbes.ksu.ksu.edu

Directory: pub/noaa
File: readme.doc

Agriculture

PENpages

Audience: Anyone.
Contents: Online articles and brochures on agriculture, careers, health, consumer issues, weather, from The Pennsylvania State Department of Agriculture, Pennsylvania State University College of Agriculture, and Rutgers University.
Comments: Highly accessible, general information. Not a research oriented service; vt100 terminal emulation recommended.
Access: Accessible by TELNET

TELNET: psupen.psu.edu
Login: PNOTPA

Contact: e-mail: support@psupenn.psu.edu

Art Hussey, Assistant Director
Computer Services
Office of Administrative Services
The Pennsylvania State University
405 Agricultural Administration Building
University Park, PA 16802
(814) 863-3449

More Info: NNSC Internet Resources Guide, Section 3.14

PENpages User Guide: online, or request from above address.

Area Studies

INFO-SOUTH Latin American Information System

Audience: Anyone but a subscription charge is required.
Contents: Very extensive listings of citations and abstracts on a wide variety of Latin America issues.
Access: Accessible by TELNET:

TELNET: sabio.ir.miami.edu

Contact: e-mail: msgctr@sabio.miami.edu

INFO-SOUTH Latin American Information System
Institute of Interamerican Studies / North-South Center
Graduate School of International Studies
PO Box 248014
Coral Gables, FL 33124-3211
tel: (305) 284-4414

More Info: NNSC Internet Resources Guide, Section 3.22

Latin American Data Base (LADB)

Audience: Anyone interested in accessing current information originating directly from Latin America.

Contents: 11,000 articles from 1987 to the present organized under the following titles: "Chronicle of Latin American Economic Affairs," "Central America Update," and "SOURCEMEX--Economic News and Analysis on Mexico." Hundreds of new articles added each month.

Comments: You must contact LADB (see below) to arrange access.

Access: Once you have contacted the LADB, you can access LADB through the Internet or by a modem call to an 800 number.

Contact: To establish access, contact:

Roma Arellano
ladbad@bootes.unm.edu
Latin American Institute
University of New Mexico
801 Yale NE
Albuquerque, NM 87131-1016
(505) 277-6839

More Info: NNSC Internet Resources Guide, Section 3.26.

There is a special LISTSERV list devoted to discussion about this database:

ch-ladb@unm.bitnet%umrvmb.umr.edu

Artificial Intelligence

Bibliographic Mailserver for Artificial Intelligence Literature

Audience: Researchers in Artificial Intelligence.

Contents: Bibliographies of artificial intelligence literature, currently containing more than 20,000 references.

Comments: Most appropriate for researchers already very familiar with Artificial Intelligence. This data set is not well-suited for casual browsing.

Access: Via a mailserver. The host machine is in Germany, so if your primary language is English, you need to specify that output be sent to you in English.

Mailserver: lido@cs.uni-sb.de
Subject: lidosearch info english

Contact: kobsa@cs.uni-sb.de

Dr. Alfred Kobsa
Department of Information Science
University of Konstanz
D-W-7750 Konstanz 1 Germany
tel: (+49) 7531 88 1

More Info: NNSC Internet Resources Guide, Section 3.29

University of California at Irvine Repository Of Machine Learning Databases and Domain Theories

Contents:	75 databases and domain theories useful for evaluating learning algorithms. The dataset files are divided into two parts: filename.data (which contains raw data), and filename.names, which contains documentation about the dataset file. Some of the files in the archive are not datasets, but rather generate datasets.
Contents:	All files can be freely copied to your own computer for use.
Access:	Accessible by FTP and an e-mail server.

FTP Host: ics.uci.edu
directory: pub/machine-learning-databases

mail: archive-server@ics.uci.edu
subject: (none needed)
message: help

Contact: ml-repository@ics.uci.edu

aha@cs.jhu.edu

Astronomy / Space Science

Astronomers

Audience:	Professional Astronomers.
Contents:	Contact information for astronomers and astronomical facilities around the world
Comments:	Not to be used for trivial or commercial purposes.
Access:	Send an e-mail request for this guide to:

e-mail@srf.ro-greenwich.ac.uk

NED--NASA / IPAC Extragalactic Database

Audience:	Anyone.
Contents:	Extensive information on 132,000 extragalactic objects (galaxies, quasars, infrared and radio sources), and software to search raw data and associated bibliographies.
Comments:	Includes an online tutorial. Much of the software and some of the data are available for local use from the FTP host (see More Info)
Access:	Accessible through TELNET.

TELNET: ipac.caltech.edu
login: ned

Contact: ned@ipac.caltech.edu

NED c/o IPAC
MS 100-22
California Institute of Technology
Pasadena, CA 91125
(818) 584-2903

More Info: Extensive online help.

FTP Host: ipac.caltech.edu
files: README files in various directories
NNSC Internet Resources Guide, Section 3.21

NSSDC--National Space Science Data Center

Audience:	Anyone.
Contents:	Official clearinghouse for NASA data, containing a directory of publicly available data. Datasets referenced by this service include: Global change datasets; Nimbus-7 GRID TOMS data; Interplanetary Medium Data (OMN); Geophysical Models; International Ultraviolet Explorer Data; Voyager and other planetary images; Earth observation data; Star catalogs. The TELNET front end also allows access to the Standards and Technology Information System, back issues of CANOPUS newsletters, etc.
Comments:	Although the data must be purchased (on CD-ROM, diskette, or magnetic tape) the prices are not high considering the amount and quality of data available (for example, a set 8 CDs of Voyager images is $ 75). You can set up an official account with user-id and password if you plan to use NODIS more than once.

Access: Accessible through TELNET.

TELNET: nssdca.gsfc.nasa.gov
login: nodis

Contact: request@nssdca.gsfc.nasa.gov

National Space Science Data Center
Request Coordination Office
Goddard Space Flight Center
Code 633
Greenbelt, MD 20771

(301) 286-6695

SDDAS--Southwest Research Data Display and Analysis System

Audience:	Anyone doing research in space, magnetosphere or upper atmospheric physics.
Contents:	Data from upper atmosphere collected from a number of satellites (currently, Dynamic Explorers 1 and 2, UARS Partial Environment Monitor, and TSS-1 ROPE).
Comments:	Although anyone can "take it for a spin," real use requires authorization from the contact person listed below. The service is menu driven and easy to use. If you are using certain graphics terminals, this service allows you to view many of the datasets in sophisticated graphical displays.
Access:	Accessible through TELNET.

TELNET: espsun.space.swri.edu 540

Contact: sddas-help@pemrac.space.swri.edu

Dr. J.D. Winningham
Southwest Research Institute
Division of Instrumentation and Space Sciences
P.O. Drawer 28510
San Antonio, TX 78228-0510
(512) 522-3259

More Info: NNSC Internet Resources Guide, Section 3.7

Online, menu driven help
User's Guide mailed to authorized users
Detailed listing of data holdings can be requested from:

sddas-help@pemrac.space.swri.edu

SIMBAD--Set of Identifications, Measurements, and Bibliography for Astronomical Data

Audience:	Astronomers with NASA or NSF contracts.
Contents:	Data and bibliographic entries for stars and subsets of non-stellar objects
Comments:	This service may become available via a CREN mail server in the near future, which is why it is included in this general listing.
Access:	Accessible through TELNET, but one must have an account.
Contact:	simbad@cfa.harvard.edu

SIMBAD c/o Computation Facility
Smithsonian Astrophysical Laboratory
60 Garden St., MS 39
Cambridge, MA 02138
(617) 495-7301

More Info: NNSC Internet Resources Guide, Section 3.5

SPACELINK

Audience: Anyone.

Contents: Database and interactive system containing information about NASA and NASA activities. A large number of possible curricular activities for elementary and secondary science classes.
Comments: A tremendously valuable resource for elementary and secondary science teachers. Very easy to use. In your first TELNET session, you will be prompted to create a unique user-id and password for subsequent sessions. Files of interest can be downloaded either during an interactive TELNET session, or by accessing the FTP file archives.
Access: Accessible by TELNET and FTP.

TELNET: 128.158.13.250
user-id: newuser
password: newuser

FTP Host: ames.arc.nasa.gov
directory: pub/SPACE/SPACELINK

More Info:

FTP Host: ames.arc.nasa.gov
directory: pub/SPACE/SPACELINK
file: Spacelink.index

Yale Bright Star Catalog

Audience: Anyone.
Contents: Machine-readable version of the 4th Edition of the Yale Bright Star Catalog, including such variables as photoelectric magnitudes, MK spectral types, parallaxed, and radial velocity comments (indication and identification fo spectroscopic and occulation binaries), projected rotational velocities, variability, spectral characteristics, duplicity, and group membership
Comments: These files are set up for MS-DOS microcomputers.
Access: Accessible through FTP.

For a version usable with MS-DOS computers:

FTP Host: pomona.claremont.edu
directory: yale_bsc
files: all files in the directory

For a version usable by Unix computers:

FTP Host: mandarin.mit.edu
directory: astro/data.etc/yale.bright/starchart
files: all files

Contact: jdishaw@hmcvax.claremont.edu
More Info:

FTP Host: pomona.claremont.edu
directory: yale_bsc
files: read.me
yaleread.me

Census Data

Michigan Archives of 1990 Census of Population and Housing

Audience: Anyone.
Contents: Michigan Census data includes summaries of summary tape files for states, counties, and places; publication programs of all papers and electronic products from the 1990 U.S. Census; guides to census questionnaires and geographic concepts used by the U.S. Census Bureau; guides to using CD-ROM disks of the PL94-171 datasets.
Comments: This is a slightly unusual FTP host. To enter the Census directory, issue "cd lelf:" --be sure to include the ":"! The basic FTP commands, such as "dir" and "get", will then work.
Access: Accessible through FTP.

FTP Host:	ub.cc.umich.edu	
directory	lelf:	(be sure to include the ":"!)
files:	all files in the directory	

Contact: grace.york@ub.cc.umich.edu

Grace York
Documents Center
University of Michigan
Ann Arbor, MI
(313) 764-0410

More Info:

FTP Host:	ub.cc.umich.edu	
files:	lelf:census	(directory of available files)
	lelf:cenguide	(guide to census, etc.)

Chemistry

IuBIO--Indiana University Archive for Molecular and General Biology

Audience: Anyone.
Contents: Chemistry software for DOS, MAC, etc.
Comments: Getting the document "Archive.doc" via FTP will make it easier for you to use this service.
Access: Accessible through FTP

FTP Host: ftp.bio.indiana.edu

Contact: archive@bio.indiana.edu

Don Gilbert
BioComputing Office
Biology Department
Indiana University
Bloomington, IN 47405

More Info: NNSC Internet Resources Guide, Section 3.13.

FTP Host: ftp.bio.indiana.edu
Files: Archive.doc

Computer Software

General Information about Computer Software Databases

There are countless archives of computer software available through the Internet. This section is not meant to be a comprehensive listing.

Computer Software (General Purpose Archives)

Washington University Public Domain Archives

Audience: Anyone.
Contents: An immense quantity of public domain and shareware software for the Amiga, Apple II, Atari, CP/M, DOS, GNU, Macintosh, Sun, TeX, Unix, VAX/VMS, X Windows operating environments. This server "mirrors" a number of other FTP hosts around the world. When mirrored archives receive new information, it is sent also to WUARCHIVE. The archive also contains files besides computer software, but software is its main strength.
Comments: A simple listing of just the filenames contained in this archive is over 7 megabytes in size. To use this archive effectively, it is crucial that you get the README files for each directory whose contents you want to explore. We recommend that you follow the suggestions provided in these README files.

Access: Accessible through FTP.

FTP Host: wuarchive.wustl.edu

Contact: archives@wugate.wustl.edu

Washington University
Office of the Network Coordinator
One Brookings Drive
Campus Box 1045
St. Louis, MO 63130-4899

COSMIC

Audience: U.S. citizens (with occasional exceptions).
Contents: Computer software for a wide variety of applications and operating systems created under projects funded by NASA (thus the restriction to U.S. citizens). The COSMIC staff can also perform searches through the COSMIC database to locate programs appropriate to your interests and needs.
Comments: Most of the software must be purchased.
Access: E-mail requests for information only.
Contact: service@cossack.cosmic.uga.edu

COSMIC

The University of Georgia
382 East Broad Street
Athens, GA 30602
(404) 542-3265

More Info: NNSC Internet Resources Guide, Section 3.12.

Computer Software (Operating System Specific)

SUPERSFT--IBM Supercomputing Program Database

Audience: Anyone.
Contents: Catalog of programs suitable for use on IBM supercomputers using vector or parallel processing. The actual programs are not available through this service.
Comments: If you have written such programs, you can submit information about your program for inclusion in the catalog.
Access: Via a LISTSERVer, send e-mail to:

listserv@uicvm.cc.uic.edu

With one of the following in the body of the message:

get supersft help	(to get supersft help)
get supersft index	(for an index of files)
get filename filetype	(to obtain a particular (file of interest from (the supersft index list)

Contact: supersft@uicvm.cc.uic.edu

Supercomputing Support Office
University of Illinois at Chicago
Computer Center (mail code 135)
Box 6998
Chicago, IL 60680
(312) 996-2981

More Info: NNSC Internet Resources Guide, Section 3.8

VxWorks Users Group Archives

Audience: Anyone using or interested in the VxWorks operating environment.
Contents: VxWorks programs and information.
Access: Accessible through FTP and e-mail server.

FTP Host: thor.atd.ucar.edu
directories: pub/vx
pub/unix

Mailserver: vxworks_archive@ncar.ucar.edu
subject: (none needed)

message: send index

Contact: thor@thor.atd.ucar.edu

Richard Neitzel
National Center for Atmospheric Research
Box 3000
Marshall Field Site
Boulder, CO 80307
(303) 497-2057 or (303) 497-2060

Ecology and Environment

General Information about Ecological and Environmental Databases

A new printed periodical called "The Green Library Journal: Environmental Topics in the Information World" aims to disseminate information about environmental databases and international environmental information centers. For more information about "The Green Library Journal," contact:

anna@idui1.csrv.uidaho.edu

Maria Jankowska, Editor
Green Library Journal
University of Idaho Library
Moscow, Idaho, U.S.A. 83843-4198

(208) 885-6260
Fax: (208) 885-6817

CEAM--Center for Exposure Assessment Modeling

Audience:	Anybody interested in environmental simulation models
Contents:	Environmental simulation models for: urban and rural non-point sources, conventional and toxic pollution of streams, lakes and estuaries, tidal hydrodynamics, geochemical equilibrium, and aquatic food chain bioaccumulation.
Comments:	CEAM is not on the Internet, yet, but might be by time you read this. All software is in the public domain.
Access:	Modem calls to CEAM Bulletin Board Service: (404) 546-3402.
Contact:	jim@crom2.rn.com

Jim Fuller
Center for Exposure Assessment Modeling
Environmental Research Laboratories
U.S. Environmental Protection Agency
Athens, GA 30613

Environmental Exchange

Audience:	Anyone.
Contents:	Database of environmental issues including air and water quality, land-use, energy, waste, wildlife and environmental education programs.

Comments: ECIX is supported by the Joyce Mertz-Gilmore Foundation and the Energy Foundation.
Access: Contact Environmental Exchange for information.
Contact: tgray@igc.org

The Environmental Exchange
1930 18th St. NW
Suite 24,
Washington, DC 20009
(202) 387-2182

Education

Online Database for Distance Education

Audience: Anyone.
Contents: Information on education through computer networks.
Comments: Subscription charges may be levied as of 1992.
Access: From the U.S., one must go through the Internet / Janet gateway TELNET server, so there are considerably more prompts than you have encountered in within Internet TELNET. Note that once you are at the hostname prompt, you have access to many other Janet resources as well.

TELNET: sun.nsf.ac.uk
login: janet
hostname: uk.ac.open.acs.vax
User name: ICDL
Your name: your name
Inst.: your institutional affiliation

Contact: n_ismail@vax.acs.open.ac.uk, *or* kw_harry@vax.acs.open.ac.uk

ICDL
c/o The Open University, Walton Hall
Milton Keynes, MK7 6AA
United Kingdom
tel: (+44 908) 653537

More Info: NNSC Internet Resources Guide, Section 3.28.

Genetics and Molecular Biology

General Information about Genetics and Molecular Biology Databases

If you intend to use any of the Genetics and Molecular Biology databases listed in this section, you are advised to get the LiMB database to get an overview of what is available. Most, but not all, of the databases in this section are described in LiMB, which is constantly kept up to date.

LiMB Database--Listing of Molecular Biology Databases

Audience: Anyone.
Contents: A Database of Molecular Biology Databases LiMB.

Comments: The essential resource for anyone using, or thinking of using, Genetic and Molecular Biology Databases. If you are creating such a database, these are the people to notify to be sure of broad notification in the Molecular Biology community.

Access: The LiMB database of databases can be obtained either by sending a mail request to an electronic mail server, or by getting the file by FTP:

Electronic Mail Server requests:

mail: bioserve@genome.lanl.gov
subject: (none needed)
message: limb-data

FTP source (one of several)

FTP Host: ncbi.nlm.nih.gov
directory: repository/LiMB
file: limb

Contact: limb@genome.lanl.gov

LiMB
T-10, Mail Stop k710
Los Alamos National Laboratory
Los Alamos, NM 87545
(505) 665-3493

More Info:

FTP Host: ncbi.nlm.nih.gov
directory: repository/LiMB
file: README

Bibliography of Theoretical Population Genetics

Audience: Anyone.
Contents: A comprehensive bibliographic listing of articles on theoretical population genetics.
Comments: The two letters at ends of filenames indicate the range of primary author's last names in citations contained in each file; e.g., "bible.ac" contains references from authors whose names begin with "Aa" to "Ce."
Access: Accessible through FTP.

FTP Host: evolution.genetics.washington.edu
directory: bible
files: bible.ac
bible.cf
bible.fh
bible.hl
bible.lm
bible.mr
bible.rs
bible.sz

Contact: joe@genetics.washington.edu

Joe Felsenstein
Department of Genetics SK-50
University of Washington
Seattle, WA 98195

ENZYME

Audience: Anyone.
Contents: Dictionary of 3072 enzymes; contains nomenclature, information about catalytic activity, co-factors, diseases associated with the enzyme. Cross references to the SWISS-PROT dataset.
Comments: Version 7.0 will be available November, 1991.
Access: Accessible through FTP and e-mail server.

FTP Host: ncbi.nlm.nih.gov
directory: repository/ENZYME
files: enzyme.dat
enzyme.asn

Mailservers: netserv@embl-heidelberg.de
genbank.bio.net

Contact: bairoch@cmu.unige.ch

Amos Bairoch
Medical Biochemistry Department
Centre Medical Universitaire
1211 Geneva 4
Switzerland
tel: (+41 22) 61 84 92

More Info: Users Guide.

FTP Host: ncbi.nlm.hnih.gov
directory: repository/ENZYME
file: enzuser.txt

Gene-Server

Audience: Molecular Biologists / Geneticists.
Contents: A huge number of software programs for molecular biologists and Geneticist, and several databases including: GenBank; PIR protein sequences; R. Roberts Restriction Enzyme Database; and Matrix of Biological Knowledge Archive Server files
Access: Mail server:

mail: gene-server@bchs.uh.edu
subject: (none needed)
message: send help

Contact: davison@uh.edu

Dan Davison

(713) 749-2801

More Info: NNSC Internet Resources Guide, Section 3.1.

IuBIO--Indiana University Archive for Molecular and General Biology

Audience:	Anyone.
Contents:	Molecular biology software for a variety of operating systems and data (particularly *Drosophila* genetics).
Comments:	Getting the document "Archive.doc" via FTP will make it easier for you to use this service.
Access:	Accessible through FTP.

FTP Host: ftp.bio.indiana.edu

Contact: archive@bio.indiana.edu

Don Gilbert
BioComputing Office
Biology Department
Indiana University
Bloomington, IN 47405

More Info: NNSC Internet Resources Guide, Section 3.13

FTP Host: ftp.bio.indiana.edu
files: Archive.doc

Johns Hopkins Genetic Databases

Audience:	Anyone.
Comments:	You must register first with the contact person listed below for a user-id and password.
Contents:	Online data from "Mendelian Inheritance in Man".
Access:	Accessible through TELNET.

TELNET: welch.jhu.edu

Contact: help@welch.jhu.edu

GDB/OMIM User Support
William H. Welch Medical Library
1830 E. Monument St. Third Floor
Baltimore, MD 21205
(301) 955-7058

MBCRR--Molecular Biology Computer Research Resource

Audience:	Anyone.
Contents:	Source code and documentation for DNA and protein sequence analysis software for Unix.
Access:	Accessible through FTP

FTP Host: mbcrr.harvard.edu

directory: MBCRR-Package

Contact: tsmith@mbcrr.harvard.edu

MBCRR, LG-S127
44 Binney St.,
Boston. MA 02115
(617) 732-3746

More Info: NNSC Internet Resources Guide, Section 3.20.

FTP Host: mbcrr.harvard.edu
directory: MBCRR-Package
file: README

PROSITE

Audience: Anyone, but most useful to molecular and structural biologists.
Contents: Dictionary of protein sites and patterns.
Access: Accessible through FTP.

FTP Hosts: ncbi.nlm.nih.gov
directory: repository/PROSITE
file: prosite.dat

Contact: bairoch@cmu.unige.ch

Amos Bairoch
Medical Biochemistry Department
Centre Medical Universitaire
1211 Geneva 4
Switzerland
tel: (+41 22) 61 84 92

More Info: Bairoch, A., 1991, Nucleic Acids Research 19:2241-2245.

Handbook and User Manual

FTP Hosts: ncbi.nlm.nih.gov
directory: pub/prosite
files: prosite.txt (Users Manual)
prosite.doc (Handbook)

SEQANALREF

Audience: Anyone.
Contents: DNA sequence analysis bibliography containing 1657 references.
Comments: Version 21.0 available in October, 1991.
Access: Accessible through FTP.

FTP Hosts: ncbi.nlm.nih.gov
directory: repository/SEQANALREF
files: seqanalr.dat (the bibliography)
seqanalr.txt (a help file)

Contact: bairoch@cmu.unige.ch

Amos Bairoch
Medical Biochemistry Department
Centre Medical Universitaire
1211 Geneva 4
Switzerland
tel: (+41 22) 61 84 92

More Info: Bairoch A. 1991. SEQANALREF: a sequence analysis bibliographic reference data bank. CABIOS 7:268-268(1991).

SWISS-PROT

Audience: Anyone.
Contents: Protein sequence data bank containing 21,795 sequences and 21,773 references.
Comments: Release 20.0 will be available in November, 1991; tape and CD ROM distribution in late 1991.
Access: Accessible through FTP.

FTP Hosts:	ncbi.nlm.nih.gov	
directory:	repository/SWISS-PROT	
file:	userman.txt	(ASCII users manual)

Contact: bairoch@cmu.unige.ch

Amos Bairoch
Medical Biochemistry Department
Centre Medical Universitaire
1211 Geneva 4
Switzerland
tel: (+41 22) 61 84 92

More Info: Bairoch A., Boeckmann B.; Nucleic Acids Res. 19:2247- 2249(1991).

Geography

Geographic Name Server

Audience: Anyone, but please do not use frivolously!
Contents: Currently, geographic information for U.S. cities, counties, states as well as some natural features taken from the U.S. Geodetic Survey, and the U.S. Postal Service. There are plans for worldwide coverage. Variables stored include names, elevation, latitude, longitude, population, telephone area code and FIPS codes where appropriate.
Comments: The output from this program is most easily used as input for other software packages.
Access: TELNET.

telnet martini.eecs.umich.edu 3000

Contact: Tom Libert
libert@eecs.umich.edu
(313) 936-3000

Government and Politics

U.S. Senate Bibliographies

Audience:	Anyone.
Contents:	Bibliographies of U.S. Senate Committee hearings and publications for the 99th-102nd Congresses.
Comments:	Filenames in the database have a very particular way of being put together which you should understood before using the database. Be sure to obtain the file readme.gwp9108 which explains these formats.
Access:	Accessible through FTP and e-mail server.

FTP Host: ncsuvm.cc.ncsu.edu
directory: senate
file: readme.gwp9108 (basic information file; the last four numbers represent year & month of file version)

e-mail: listserv@ncsuvm.cc.ncsu.edu
subject: (none needed)
message: get readme gwp9108 senate
floppy disks by mail

Contact: John A. McGeachy

Documents Department
D.H. Hill Library,
North Carolina State University
Raleigh, NC
27695-7111
(919) 515-3280

Grants and Contracts

STIS--Science and Technology Information System (NNSC)

Audience:	Anyone.
Contents:	National Science Foundation publications, including NSF Bulletin, Guide to NSF Programs, grants booklet including application forms, grants program announcements, press releases, NSF telephone book, reports of National Science Board, abstracts and descriptions of research projects currently funded by NSF, and analytical reports and news from the International Programs division.
Comments:	TELNET and modem service features prompts and full screen menus, online viewing of documents, database search utilities, provisions for downloading, and tutorial.
Access:	STIS can be used through FTP, TELNET, or dial in calls by modem:

FTP Host: stis.nsf.gov
directory: all directories
files: all files

TELNET: stis.nsf.gov
login: public
MODEM CALL: (202) 357-0359, or (202) 357-0360
Terminal emulation settings should be term=VT100, parity=even, data bits=7, duplex=full.

Contact: stis@nsf.gov

Dr. STIS
National Science Foundation
Office of Information Systems,
Room 401
1800 G. Street, N.W.
Washington, D.C. 20550
(202) 357-7555

More Info: Online help during TELNET sessions.

STIS Manual, available from:

FTP Host:	stis.nsf.gov	
files:	stishelp.man	(ASCII format)
	stishelp.wp5	(WordPerfect 5 format)

History

General Information about History Databases

The FTP host ra.msstate.edu contains a great deal of information about history databases. This is a very good source to check periodically if you want to keep abreast of developments in history databases. The directory listed below also contains many online archives, articles, bibliographies, and other electronic documents. The archives are maintained by Don Mabry of Mississippi State University.

FTP Host:	ra.msstate.edu	
directory:	pub/docs/history	(contains many directories holding files of interest to historians)

MEMDB (Medieval and Early Modern Data Bank)

Audience:	Contact MEMDB.
Contents:	Data on western Europe between 800-1800 A.D.
Comments:	One must pay subscription fees to RLIN
Access:	Through Research Libraries Group, Inc.
Contacts:	

MEMDB:The Medieval and Early Modern Data Bank
Department of History CN 5059
Rutgers, The State University of New Jersey
New Brunswick, NJ 08903

RLIN: RLIN Information Center
Research Libraries Group, Inc.
1200 Villa St.
Mountain View, CA 94041-1100

More Info: NNSC Internet Resources Guide, Section 3.3 (MEMDB)
NNSC Internet Resources Guide, Section 2.4 (RLIN)

Literature

Dartmouth Dante Project

Audience: Anyone.
Contents: A database containing the text of Dante's "Divina Commedia" and full texts of 600 years of scholarly commentary on the work. The database uses the BRS/Search program. Currently, 46 of 60 planned commentaries has been installed.
Comments: Online help, and printed user manual for $4.00 Note that many of the commentaries are copyrighted, so the database itself cannot be distributed. Available 24 hours a day, except for Monday, 4:15-6:30 am Eastern Time.
Access: Internet access via TELNET or modem:

TELNET: library.dartmouth.edu (or 129.170.16.11)

modem access: (603) 643-6300 (300 and 1200 baud)
(603) 643-6310 (> 1200 baud)

After connecting by either TELNET or modem, supply terminal emulation information ("unknown" will work for most sessions); when you see the "->" prompt, type:

```
connect dante
```

to connect to the Dante Database.

Contact: dante@dartmouth.edu

Dartmouth Dante Project
1 Reed Hall
HB 6087
Dartmouth College
Hanover, NH 03755
(603) 646-2633

Mathematics

MATLAB User Group Archive

Audience: Anyone interested in or using the MATLAB numeric computation system.
Contents: MATLAB functions and utilities.

Comments: These MATLAB files are also accessible from NETLIB (please see next entry). If you choose not to use NETLIB, you are encouraged to subscribe to the MATLAB users digest by sending a subscription request, including your e-mail user-id and address, to: matlab-users-request@mcs.anl.gov
Access: Via e-mail server:

mail: netlib@ornl.gov
subject: (none needed)
message: send index from matlab

Contact: bischof@mcs.anl.gov

Christian Bischoff
Math and Computer Sciences Division
Argonne National Labs
Argonne, IL 60439
(708) 972-8875

More Info: NNSC Internet Resources Guide, Section 3.18.

To subscribe to the MATLAB user's digest, send a request including you user-id and e-mail address to:

matlab-users-request@mcs.anl.gov

Netlib Mathematical Software Distribution System

Audience: Anyone using or writing mathematical software.
Contents: Library of mathematical software and algorithms; also a menu driven service called "walk" which allows one to find the appropriate algorithm for a particular purpose.
Comments: A tremendously valuable resource.
Access: Accessible through FTP, e-mail server, TELNET, and modem.

FTP Host: research.att.com
login: netlib
directory: all

Mail-server Access: North American users should send mail to

netlib@ornl.gov *or*
netlib@research.att.com

subject: (none needed)
message: send index

TELNET: research.att.com
login: walk

Modem Access: (908) 582-1238
login: walk

Contact: Eric Grosse, AT&T Bell Labs 2t-504, Murray Hill, NJ 07974

e-mail: ehg@research.att.com
tel: (908) 582-5828

Maple FTP Archives

Audience: Anyone using or interested in Maple mathematical software.
Contents: Maple software tools.
Access: Accessible through FTP.

FTP Hosts: 129.132.101.33 (neptune) ETH Zurich, Switzerland
129.97.128.58 University of Waterloo, Canada

Mathematica FTP archives

Audience: Anyone using or interested in the Mathematica software package.
Contents: Mathematica software tools.
Access: Accessible through FTP.

FTP Hosts: otter.stanford.edu
ftp.ncsa.uiuc.edu
nic.funet.fi
fenris.claremont.edu
siam.unibe.ch
vax.eedsp.gatech.edu

Music

Music and Lyrics Archives

Audience: Anyone.
Contents: Lyrics for thousands of contemporary rock albums, discographies and commentary on the classical music repertoire.
Comments: There is a directory to receive contributions to the archive (pub/tmp/incoming).
Access: Accessible through FTP.

FTP Host: vacs.uwp.edu
directory: pub/lyrics
file: files.directory

Contact: datta@vacs.uwp.edu

Physics

PINET--Physics Information Network.

Audience: Registered users.
Contents: SPIN and General Physics Advanced Abstracts, bibliographic databases, job announcements, AIP meetings, news releases, and announcements, ordering of AIP publications.
Comments: This is a for fee service which requires an initial registration fee, and hourly connect charges.
Access: Accessible through TELNET

TELNET: pinet.aip.org

Statistics

Statlib Statistical Software and Data Distribution System

Audience: Anyone.
Contents: Statistical software, algorithms, datasets, directory of statisticians.
Access: Statlib is accessible via FTP and e-mail server.

FTP Host: lib.stat.cmu.edu
login name: statlib
password: your-e-mail-address

Mail server: statlib@lib.stat.cmu.edu
subject: (none needed)
message: send index

Statlib will send a file containing information about the contents of the archives, and more detailed instructions on how to use the mailserver.

Contact: Michael Meyer

mikem@stat.cmu.edu
Department of Statistics
Carnegie Mellon University
Pittsburgh PA, 15213
(412) 268-3108

More Info: NNSC Internet Resources Guide, Section 3.19.

For More Information about Internet Databases and Bibliographies

Databases as Sources of Information about Databases

If there are databases in this chapter which are of special interest to you, you can communicate with their appropriate contact people for information to determine what other related databases exist or are being planned. In many cases, the databases listed in this chapter contain many pointers to other related databases (for example, the History archives at Mississippi State University provides information on a wide variety of history-specific sources throughout the world).

Fellow Internet Users and Peers as Sources of Information about Databases

If you are interested in particular classes of databases, you are advised to subscribe to some of the more quantitatively oriented Internet discussion groups to keep up to date on what databases are available to researchers in your field -- in fact, much of the information about online databases provided in this chapter was collected by following up on postings to discipline specific LISTSERV and USENET discussion groups. Refer to Section 3 of NUSIRG for more information on using LISTSERV and USENET, and how to determine what discussion groups are most appropriate for your needs.

Other Printed Compendia of Internet Databases

Chapter 2 of the following source contains continually updated information about a variety of Internet databases and bibliographies:

NSF Network Service Center. (1988 -). Internet Resource Guide. NSF Network Service Center, Cambridge, MA

FTP Host:	nnsc.nsf.net
directory:	resource-guide
files:	chapter2-ps.tar.Z (compressed and archived PostScript version of Chapter 2
	chapter2.txt.tar.Z(compressed and archived ASCII version of Chapter 2.

Chapter 2 of the following printed document provides detailed information about 10 Internet databases:

NYSERNet, Inc. 1991. NYSERNet New User's Guide to Useful and Unique Resources on the Internet. NYSERNet, Inc. Syracuse, NY.

Chapter 13: WAIS (Wide Area Information Server) : An Interface to Databases

WHAT IS WAIS?

WAIS is an innovative "information server" program which allows you to search diverse databases on the Internet from a single, easy-to-use interface.

For example, WAIS currently allows you to:

☐ read newspapers,
☐ get information on any country in the world,
☐ scan many specialized databases,
☐ get information about the Internet,
☐ and much more.

HOW WAIS WORKS

All versions of WAIS operate in the same way. WAIS runs on a "client" machine, such as a Macintosh connected to the Internet, and queries "server" machines which contain the actual databases (such as a Connection Machine in Cambridge, MA).

The WAIS client presents a uniform search interface, and translates the user's request into a syntax understood by the various servers. You don't need to know anything about the various query languages of the server databases to use WAIS.

WAIS is particularly adept at handling complex textual information. It can search through many large documents for the occurrence of keywords, and list which documents are of relevance to your query. Each document gets a score, ranging from 1-1000, for how well the document corresponds to what you want to find (with 1000 being deemed a "perfect fit"). The criteria by which WAIS determines relevance of documents can be modified to customize searches even more closely to the user's needs. This customization process uses a method called "relevance feedback."

One of the many exciting possibilities opened up by WAIS and related Information Servers is that you can create a "Personal Electronic Newspaper." You can have WAIS automatically pull all items of interest together into a single document monthly, weekly, or even daily.

There are versions of WAIS available for the Mac, Unix computers, X-window terminals, and VMS. If you want to install a copy of WAIS on your own system, read the section "How to Get a Copy of WAIS" at the end of this document.

FOR CURRENT INFORMATION ABOUT WAIS

WAIS is so new and rapidly evolving that this document will probably be out of date by time you read it. There will probably be hundreds of WAIS clients running on many different Internet hosts with access to hundreds of databases.

If you want to use or learn more about WAIS you are strongly encouraged to subscribe to one of the WAIS discussion groups or mailing listed at the end of this document to keep posted on the rapid development of this exciting new Internet resource.

USING WAIS

To illustrate the use of WAIS, we will show a session using the SWAIS program, which is a generally accessible and easily used implementation of WAIS on the Internet. Note that many of the details of using WAIS would be different on Mac or X-windows based implementations, which make extensive use of icons and the mouse.

SWAIS is one of several interactive, window oriented versions of WAIS. WAIS can also be run as a command line program which allows much more powerful and automated searching of server databases.

A SAMPLE WAIS SESSION USING "SWAIS"

To use the SWAIS version of WAIS you should use full screen terminal emulation, such as vt100. Ask your local user service staff or instructor if you need help.

Lines preceded by U> indicate lines on which you enter commands; lines preceded by W> indicate responses from WAIS.

Boxes represent screens you will see, in whole or in part, during your SWAIS session.

To get started, just TELNET to quake.think.com:

```
U> telnet quake.think.com

W> SunOS UNIX (quake.think.com)

U> LOGIN:        wais
U> TERM = (unknown)     vt100
```

If you have specified a full screen terminal type, such as vt100, you should now see something like the following on your screen:

```
SWAIS                         Source Selection                        Sources:24

  #                 Server                      Source                    Cost

01:      [             quake.think.com]  directory-of-servers             Free
02:      [             hub.nnsc.nsf.net]  ietf-documents                  Free
03:      [             hub.nnsc.nsf.net]  internet-drafts                 Free
04:      [             quake.think.com]  internet-rfcs                    Free
05:      [              cmns.think.com]  info-mac                         Free
06:      [             quake.think.com]  US-Gov-Programs                  Free
07:      [        cossack.cosmic.uga.e]  Cosmic-abstracts                 Free
08:      [        cossack.cosmic.uga.e]  Cosmic-programs                  Free
09:      [                wais.eff.org]  eff-documents                    Free
10:      [            sol.acs.unt.edu]  online-libraries                  Free
11:      [       microworld.media.mit]  poetry                            Free
12:      [              cmns.think.com]  wall-street-journal              Free
13:      [              cmns.think.com]  world-factbook                   Free
14:      [              cmns.think.com]  usenet-cookbook                  Free
15:      [              cmns.think.com]  sun-mail                         Free
16:      [            hub.nnsc.nsf.net]  internet-phonebook               Free
17:      [              cmns.think.com]  risk-digest                      Free
18:      [             quake.think.com]  sample-books                     Free
19:      [              cmns.think.com]  sample-patents                   Free

<space> select source, arrows move, <return> searches, q to quit,

? for help
```

The column labelled "server" names the Internet computer on which the database is located; "source" is a brief description of the contents of the database; and "cost" is the cost to the user. In the upper right hand corner, "sources 24" indicates that this particular WAIS server has access to 24 Internet databases.

When this screen first appears, you should see the top line highlighted. The up and down arrow keys on your keyboard allow you to move this highlighted line to different entries. To select an entry, you would use an arrow key to move to a desired source. Move the cursor to the line for the Wall Street Journal, and press the space bar. It will now have an asterisk in front of it meaning it is a source that will be searched.

What a Source Looks Like After Having Been Selected

```
...
11:      [  microworld.media.mit]        Poetry                       Free
12:   *  [  cmns.think.com]              wall-street-journal          Free
13:      [  cmns.think.com]              world-factbook               Free
...
<space> select source, arrows move, <return> searches, q to quit,

? for help
```

Now we can begin a search. Let's look for entries which contain information about tropical forests. Press the <RETURN> key, the screen will clear, and you will be presented with a keyword prompt.

The Keyword Search Window

```
U> KEYWORDS: tropical forest

Enter keywords with spaces between them; <return> to search

Searching: wall-street-journal
```

WAIS is now establishing an Internet connection to the computer "cmns.think.com", and searching through the database of Wall Street Journal articles for anything containing information relevant to the words "Tropical Forests."

In a few seconds, the search is done, and the results are displayed on your screen. The "score" column indicates WAIS's estimate as to how well that article fits your request, with 1000 being considered a "perfect fit." The articles will be listed from most to least relevant.

List of Articles Retrieved by WAIS

```
SWAIS                         Search Results                                        Item

#    Score            Source                          Title                        Lines

01:[1000]      (cmns-vax.think)      Debate About Tropical Forests Rage          169
02:[ 887]      (cmns-vax.think)      The Market -- Conservation's Best           190
03:[ 838]      (cmns-vax.think)      FORM + FUNCTION----By John                  118
04:[ 570]      (cmns-vax.think)      U.S. Forest Service   Plans a Cut           64
05:[ 537]      (cmns-vax.think)      Business Brief -- Forest Oil Corp.          31
06:[ 505]      (cmns-vax.think)      As a Substitute, Somehow the Guy            60
07:[ 496]      (cmns-vax.think)      Business Brief -- Manville Corp.:           36
08:[ 496]      (cmns-vax.think)      Manville Corp.'s Net  Fell in 1s            46
09:[ 496]      (cmns-vax.think)      Who's News:    Fletcher Challenge           31
10:[ 488]      (cmns-vax.think)      Letters to the Editor --    Dolphi          59
11:[ 488]      (cmns-vax.think)      It's Rumored They Might Enlist              62
12:[ 480]      (cmns-vax.think)      Hershey Foods, Jell-O Are Mixing I          107
13:[ 480]      (cmns-vax.think)      Forest Products    Makers to Post           150
14:[ 480]      (cmns-vax.think)      Letters to the Editor:    Owls & O          140
15:[ 472]      (cmns-vax.think)      British Columbia Reaches--Compro            41
16:[ 472]      (cmns-vax.think)      Georgia-Pacific    Earnings Drop            53
17:[ 464]      (cmns-vax.think)      Letters to the Editor:    Dolphin-          47
18:[ 448]      (cmns-vax.think)      Business Brief -- Georgia-Pacific           25
19:[ 448]      (cmns-vax.think)      Potlatch Corp. Debentures   SAN             24
<space> selects, arrows move, w for keywords, s for sources,

? for help
```

Just like in the main menu, we select a particular entry by moving the highlighted line to a desired entry, and press the space bar.

Selecting an Article

```
01:*[1000] ( cmns-vax.think) Debate About Tropical Forests Ra  169

Retrieving:    Debate About Tropical Forests Rages
```

...and then the article is displayed on the screen.

```
0050564WJ 9004060153J
WALL STREET JOURNAL (J), NO PAGE CITATION
900406
Copyright (c) 1990 Dow Jones & Company, Inc.
FOREST, MONETARY NEWS, FOREIGN EXCHANGE, TRADE (I/MON)
ENVIRONMENT (I/ENV) PULP, PAPER, PACKAGING (ALL TYPES) (I/PUL)

        Debate About Tropical Forests Rages

        Southeast Asian Officials
        Assail Conservationists

        By Raphael Pura
        Staff Reporter of The Wall Street Journal

KUCHING, Malaysia--Mention the fate of Southeast Asia's tropical forests these days and watch
official hackles rise.

"I'm not an environmental villain," protests Abdul Taib Mahmud, chief minister of Sarawak, a steamy
Malaysian state on the north coast of Borneo.  He challenges conservationists to fly over his timber-
carpeted domain: "You'll be lucky if you see any bald patches anywhere in Sarawak."   Like other
government leaders across the region, Tan Sri Taib has reason to be defensive. Like it or not,
Southeast Asia is being sucked into the center of a global controversy over the world's fast-diminishing
tropical forests.

International environmental groups assert that unless the region's governments and timber industry
mend their ways, their actions will contribute to ecological problems that ultimately will affect the
entire Earth. Rapid deforestation of the tropics, environmentalists say, threatens to wipe out species of
plant and animal life, contributes to harmful changes in the global climate, and destroys forest-
dwelling societies.
(MORE)
```

Reading an Article

You can press any key and see the rest of the article. When we've finished reading the article, the following menu reappears at the bottom of the screen.

```

<space> selects, arrows move, w for keywords, s for sources, ? for help

```

We could continue looking at the other articles in the list from the Wall Street Journal; but to make a point about the power of WAIS, let's broaden the scope of our search. By accessing another database, we can learn more about Borneo, one of the places mentioned in the article. Use the "s" command to go back to the list of databases sources.

```
U> s
```

You will see the list of sources we saw previously. Put the highlighted line on the line referencing the "Wall Street Journal," and press the space bar. This will "unselect" the Wall Street Journal. Now move the highlighted line to the next line, the "world factbook," which contains summary information on countries and places around the world.

```
13: * [      cmns.think.com]  world-factbook
```

Type "w" to get the keyword search window:

```
U> w
```

```
U> Keywords: Borneo

Enter keywords with spaces between them; <return> to search

Searching: world-factbook
```

```
SWAIS                           Search Results                     Item

#       Score     Source                  Title                                  Lines
01:     [1000]    ( cmns-vax.think)       Appendix E: Cross-Reference L          1072

<space> selects, arrows move, w for keywords, s for sources, ? for help
Retrieving: Appendix E:  Cross-Reference List of Geographic Names
```

You will now see the World Factbook Cross-Reference List of Geographic Names. Borneo is about four pages down in the list, so we need to scroll through a few pages of geographic names.

```
0000254CIA
The World Factbook 1990
900101

                    Addendum E:  Cross-Reference List of Geographic Names

This list indicates where various names including all United States Foreign Service Posts, alternate
names, former names, and political or geographical portions of larger entities can be found.  WORLD
FACTBOOK names are not necessarily approved by the United States Board on Geographic Names
(BGN). Alternate names are included in parentheses, additional information is included in brackets.

Name                                    Entry in the WORLD FACTBOOK

Abidjan (US Embassy)                    Ivory Coast
Abu Dhabi (US Embassy)                  United Arab Emirates
Acapulco (US Consular Agency)           Mexico
Accra (US Embassy)                      Ghana
Adana (US Consulate)                    Turkey
Addis Ababa (US Embassy)                Ethiopia
Adelaide (US Consular Agency)           Australia
Adelie Land (Terre Adelie)              Antarctica

--More--  (There are several more pages before we get to Borneo.)

Bora-Bora                               French Polynesia
Bordeaux (US Consulate General)         France
Borneo                                  Brunei; Indonesia; Malaysia
Bornholm                                Denmark
Bosporus                                Atlantic Ocean

(followed by many more pages of place names
```

According to this list, we can get more information about Borneo by looking at the specific listings for Brunei, Indonesia, and Malaysia. We'll select the file for Brunei to show you what a country listing looks like. As usual, press the w key to get the keyword search screen, and type "Brunei".

```
U> w
```

```
U> Keywords: Brunei

Enter keywords with spaces between them; <return> to search

Searching: world-factbook
```

```
SWAIS                          Search Results                     Item
#      Score     Source               Title                                   Lines
01:    [1000]    ( cmns-vax.think)    Country:  Brunei--Geography             224
02:    [ 864]    ( cmns-vax.think)    Country:  Malaysia--Geograp             295
03:    [ 822]    ( cmns-vax.think)    Appendix E:  Cross-Reference            1072
04:    [ 822]    ( cmns-vax.think)    THE WORLD FACTBOOK                      697
<space> selects, arrows move, w for keywords, s for sources,
? for help
```

Move the cursor to line #1, press the space bar, and the file for Brunei will be displayed.

```
0000034CIA
The World Factbook 1990
900101

Country: Brunei

- Geography

Total area: 5,770 km2; land area: 5,270 km2
Comparative area: slightly larger than Delaware
Land boundary: 381 km with Malaysia
Coastline: 161 km
Maritime claims: Exclusive fishing zone: 200 n
Territorial sea: 12 nm
Disputes: may wish to purchase the Malaysian salient that divides the country
Climate: tropical; hot, humid, rainy
Terrain: flat coastal plain rises to mountains in east; hilly lowland in west
Natural resources: crude oil, natural gas, timber
Land use: 1% arable land; 1% permanent crops; 1% meadows and pastures;
79% forest and woodland; 18% other; includes NEGL% irrigated
Environment: typhoons, earthquakes, and severe flooding are rare
Note: close to vital sea lanes through South China Sea linking Indian and
Pacific Oceans; two parts physically separated by Malaysia.

- People

Population: 372,108 (July 1990), growth rate 7.1% (1990)
Birth rate: 23 births/1,000 population (1990)
Death rate: 4 deaths/1,000 population (1990)
(Followed by much more very detailed information)
```

FOR MORE INFORMATION ON WAIS

The FTP Host at think.com contains much of what you need to know to get started using or installing WAIS.

FTP Host:	think.com	
directory:	wais	
files:	NCSA-Telnet-MacTCP.sit.hqx	(Telnet for MAC WAIS
	UNC	(directory of WAIS for SUN
	WAIStation-0-61.sit.hqx	(Version 0.61 MAC WAIS
	WAIStation-0-62.sit.hqx	(Version 0.62 MAC WAIS
	WAIStation-Canned-Demo.sit	(MAC WAIS Demo
	WAIStation-README	(GET THIS FILE....
	Z3950	(directory of Z39.50 info
	etc	(private directory
	motif-a1.tar.Z	(Motif / WAIS code
	wais-8-b1.tar.Z	(WAIS for Unix
	wais-8-b2.tar.Z	(WAIS for Unix
	wais-8-b3.tar.Z	(WAIS for Unix
	wais-corporate-paper.text	(WAIS document
	wais-overview-docs.sit.hqx	(WAIS docs. for MAC WAIS
	wais-project	(private directory

Note that all of the program files are archived and compressed. Use binary mode during your FTP transfer, and when you've received them, unarchive and uncompress the files.

OS	Unarchiving Program	Uncompressing Program
MAC	BinHex 4.0 or newer	UnStuffIt
Unix	tar	uncompress

Read the passage in Chapter 4 of NUSIRG entitled "The ABCs of Handling Special Files" if you need more information about how to use these programs.

KEEPING UP TO DATE WITH WAIS

Mailing Lists

There are a number of Internet interest groups devoted to discussions about WAIS:

wais-discussion@think.com	moderated mailings every 1 or 2 weeks.
wais-interest@think.com	major monthly announcement about WAIS
wais-talk@think.com	unmoderated and active discussion for WAIS users and implementors

To subscribe to these groups, send an e-mail message to "list-name-request@think.com":

Mail: wais-discussion-request@think.com
Subject: Subscription Request
Message: (request a subscription, and provide your name, user-id, and Internet address)

USENET Newsgroups

Read this newsgroup through your USENET newsreader software. (For information about USENET, read Chapter 7 of NUSIRG.) By time you read this, there will probably be many more USENET discussion groups which deal WAIS in the "comp" and other major hierarchies.

alt.wais	if your site doesn't receive this group, send a message to the person responsible for your site's USENET news feed.

TECHNICAL CONTACT:

Brewster Kahle
Thinking Machines Corporation
1010 El Camino Real, Suite 310
Menlo Park, CA 94025
415-329-9300 X228
brewster@think.com

Thinking Machines Corporation
245 First Street
Cambridge, MA 02142
617-234-1000

PUBLISHED REFERENCES ABOUT WAIS

Printed copies of the following and many other WAIS documents can be obtained by contacting:

barbara@think.com

Barbara Lincoln
Thinking Machines Corp.
1010 El Camino Real
Suite 310
Menlo Park, CA 94025

phone: (415) 329-9300
fax: (415) 329-9329

Markoff, J. 1991. "For the PC User, Vast Libraries." New York Times. July 3. pp.C1.

Stanfill, C., and R. Thau, 1991. "A Parallel Indexed Algorithm for Information Retrieval." Proceeding of the 12th International Conference on Research and Development in Information Retrieval SIGIR-89.

Stein, R. 1991. "Browsing Through Terabytes." Byte Magazine, May. pp. 157-164.

Chapter 14: Internet Directory Services

"In my house there's this light switch that doesn't do anything. Every so often I would flick it on and off just to check. Yesterday, I got a call from a woman in Germany. She said, 'Cut it out.'"

Steven Wright

OVERVIEW OF USING INTERNET DIRECTORY SERVICES

In the previous chapters of NUSIRG, you've learned how to:

- ☐ Use Internet tools
- ☐ Get information about information and resources

In this chapter you'll learn how to:

- ☐ Get contact information for people on the Internet
- ☐ Find e-mail addresses for computers on the Internet

With the techniques described in this chapter you will be able to independently find user-ids and addresses appropriate to your particular needs and interests, rather than having to consult already compiled lists of information.

Specifically, you will learn how to answer questions like the following:

- ☐ "What is the user-id and e-mail address for my colleague Jason Jaspers at Oregon State University in Corvallis?"
- ☐ "How do I find the Internet address of a computer at the University of Montana which has data I need for my economics class project?"

or even:

- ☐ "I think my long lost buddy from high school, Robin Sampson, might have an account on the Internet. How can I find her user-id and e-mail address?"

CURRENT CAPABILITIES OF INTERNET DIRECTORY SERVICES

Every day, we can get information about people's and companies' telephone numbers without a second thought. All we have to do is look in a phone book or call directory assistance.

Equivalent services are also becoming available for the Internet. Computer scientists are actively working on projects such as Knowbots and X.500 directory services which will be like "white pages" of users and hosts, and "yellow pages" of network services. These services are still under development. Consequently some of them are awkward to use, and contain information for only a tiny fraction of users, hosts, and services on the Internet.

But even though present-day Internet information services are very incomplete in their coverage, a small percentage of a huge number can still be a very large number. For example, the "whois" service at nic.ddn.mil probably lists somewhere around 2% of all Internet users and hosts--but this still amounts to over 75,000 users.

TECHNICAL AND ETHICAL CHALLENGES TO INTERNET DIRECTORY SERVICES

These caveats are not meant to disparage the contributions of the many people working on such projects, but rather to acknowledge the difficulty of the task with which they are wrestling.

Many technical, ethical, and economic issues significantly complicate the provision of (or even deciding whether to provide) comprehensive, reliable, and easy to use Internet directory services. In light of all these issues, providing Internet information services is one the great challenges facing computer network technology.

- ☐ Complexity of Computer Information: E-mail addresses and their user-ids are often considerably more complicated and variable in format than information needed for telephone listings. For example, one person usually has no more than one home address, while it's not unusual for a computer user to have five or six computer accounts.

- ☐ Volatility of Computer Information: In addition, e-mail addresses or user-ids change much more rapidly than postal addresses or people's names. Your town has probably been in the same state since it was established, the street you live on has probably had the same name for decades, and very few people change their first names. In contrast, the domain name of an Internet computer might change every couple of years, and your user-id(s) can be changed at any time, based on decisions made by you or by systems administrators.

- ☐ Local Information Services are Still Embryonic: In order for an Internet wide information system to be created, it would be useful (though possibly not necessary) for local site information systems to be developed and perfected. This is not yet the case. Most institutions still do not have a publicly accessible master list of local user-id's and services.

- ☐ Privacy and Security Issues: Many sites are understandably reluctant to publicize some or all addresses or user-ids because of concerns about unauthorized access to sensitive data or costly computer resources.

- ☐ Competing Paradigms: Standardized Internet protocols have already been established for transmitting data (TCP/IP) and resolving computer names (DNS). However, there are still a number of competing approaches for providing Internet "white pages" and "yellow pages" services, and, very likely, additional programs will be created in the next few years. On the bright side, however, programs, such as Knowbots, which are described below, can be used to present a single user interface for querying distinct information databases.

FINDING A PERSON ON THE INTERNET (THE EASY WAY)

It might seem old-fashioned, but you can find most people after a few well-planned phone calls or letters, at minimal cost in time and money. When you contact them, you can ask them directly for their user-id and e-mail address. Here's a typically vague "person directed" question a typical Internet user might ask which is best approached by "traditional" methods.

You: *"I had a friend in High School named Robin Sampson. We agreed that no matter what, we would get in touch with each other before 1992. She loved the Pacific coast, so I bet she's somewhere between Baja and Alaska. The last time we talked she was majoring in computer science at Oregon State, so it seems likely she might use the Internet."*

"I guess I'll try Robin's old phone number in my address book".

Tel: *"We're sorry, this number has either been disconnected or is no longer in service..."*

You: Call Alaska directory assistance:*"Could I have the number for Robin Sampson or her dad, Henry Sampson?"*

Tel: *"We're sorry, those names aren't listed for Anchorage or anywhere else in Alaska."*

You: *"Hello, is this the Oregon State alumni office? Could I have the current address for Robin Sampson, class of 1985?"*

Tel: *"We're sorry, on her alumna information form, she wrote 'Headed for the great unknown; have fun tracking me down!'"*

Don't give up yet! You could try contacting some mutual friends or checking with directory assistance in other area codes along the Pacific.

But Robin appears to be a member of the rare and elusive few who cannot be so easily found (and having read this far, you appear to be one of those people who thrive on the challenge of pushing existing technology "through the envelope").

FINDING A PERSON ON THE INTERNET WITH DIRECTORY SERVICES

If you can't find a person's Internet address by using telephone calls or postal mail, there are a few Internet directory services which you can try.

Table 1 gives a brief summary of the features and uses of the most useful Internet directory services. Table 2 summarizes the basic "how to's" of accessing each of these services.

The rest of this chapter presents more detailed information and examples on these services, and presents a few sample sessions.

Table 1: Summary of Internet Directory Services

Knowbot Information Server (KIS)

A white pages "meta-service" which searches for finding user-ids of Internet users listed in many other white pages services, including:

finger (@ any Unix host, e.g., finger@milton.u.washington.edu)
mcimail@nri.reston.va.us
mitwp@mit.edu
profile@gwen.cs.purdue.edu
profile@megaron.arizona.edu
profile@nri.reston.va.us
whois@nic.ddn.mil
X.500

This list includes most of the other services on this page, so KIS is your best candidate for "one stop" name searches.

"USENET Address Server" (hereafter referred to as"U-ASK")

Searches for user-ids and e-mail addresses of people who have posted messages to USENET discussion groups. This is a very useful service for finding "average" Internet users who have posted to USENET. It's not a full-featured directory service, just a list of names and e-mail addresses searched by the Unix grep command (this service actually has no name; "U-ASK" was coined so it could be referred to by a name in this document).

DDN Network Information Center WHOIS Service

Searches for names, user-ids, computer and postal addresses, telephone numbers and other contact information for 70,000+ registered users, hosts, organizations, gateways, and networks throughout the Internet. Most persons listed are network administrators or technical staff; especially good coverage of MILNET (formerly ARPANET).

PSI White Pages Pilot Project

Searches for names, user-ids, and e-mail addresses, primarily administrators and staff of participating institutions. This is an exploratory project of the X.500 Directory Service.

soc.net-people

This is a USENET discussion group which is devoted to helping people find other people. It is accessed by using USENET newsreader and news posting software (for more information about USENET, refer to Chapter 7 of NUSIRG). If you post to this group, you are encouraged to make your "subject" line as concise and informative as possible. For example, an intelligent posting to find our hypothetical friend Robin Sampson might look like this:

> subject: Western U.S: Robin Sampson
>
> I am attempting to locate a friend named Robin Sampson. The last I heard from her was in 1983, when she was studying computer science at Oregon State (followed by other relevant information).

Table 2: Basic Access Information for Internet Directory Services

How to Use this Table

The syntax examples present the simplest possible kind of search; most of these services have additional options for more sophisticated searches (e.g., restrict the search to users in a particular geographic region, etc.)

Service	Access Info	Addresses and Basic Syntax Examples
Knowbot	e-mail	kis@nri.reston.va.us kis@sol.bucknell.edu
	TELNET	nri.reston.va.us 185 (no password) sol.bucknell.edu 185 (no password) (you *must* include 185, the port #)
	syntax example:	query Robin Sampson
	online help:	help or ?
"U-ASK"	e-mail	mail-server@pit-manager.mit.edu
	syntax example:	send usenet-addresses/Sampson
	online help:	no
DDN.MIL	e-mail	service@nic.ddn.mil
	TELNET	nic.ddn.mil
	syntax example:	whois Sampson
	online help:	extensive help and tutorials
PSI	TELNET	wp.psi.com (login = fred) or wp2.psi.com (login--fred)
	syntax example:	whois, but please read online help. This is a complex system
	online help:	man fred or manual

KNOWBOT INFORMATION SERVER (KIS)

Summary

Retrieves user-ids, e-mail addresses, postal addresses, telephone numbers, and institutional affiliation for users throughout the Internet.

In its current implementation, KIS is set up to search other white pages datasets (thus KIS is referred to as a white pages "meta-service"). The following white pages services are currently accessed by KIS:

mitwp@mit.edu
mcimail@nri.reston.va.us
whois@nic.ddn.mil
profile@nri.reston.va.us
profile@megaron.arizona.edu
profile@gwen.cs.purdue.edu
X.500
finger (@ any Unix host, e.g., finger@milton.u.washington.edu)

This list includes most of the other services discussed in this chapter, and new services will be added as they become operational, so KIS is your best choice for "single stop" name searches.

Access Methods

☐ e-mail: kis@sol.bucknell.edu, or
kis@nri.reston.va.us

☐ TELNET: nri.reston.va.us 185, or
sol.bucknell.edu 185 (no password required)

Local Installation

KIS can be installed locally and run on computers connected to the Internet using any version of Unix with Berkeley style sockets. KIS currently has translation programs for whois (nic.ddn.mil), profile, mcimail, QUIPU, and finger. Any sites using these services can be added easily to a locally installed KIS.

Sample Knowbot Information Server Session (via TELNET)

Note that this entire session could have been performed with a single e-mail request as long as each user command was placed on a separate line.

```
User Commands (U>), KIS responses (K>)      Explanation

U> telnet nri.reston.va.us 185              (make TELNET connection)
U> services                                 (show directory services available by default
K> nic                                      at this KIS site)
K> mcimail
K> ripe
K> x500 (be sure to set the org)
K> finger@a.Unix host
U> query Robin Sampson                      (search for Robin Sampson)



K> Name:               Robin Sampson
K> Organization:       Oregon State University
K> Address:
K> City:               Corvallis
K> State:              OR
K> Country:            US
K> Zip:                97331-3902
K> Phone:              503/555-9999
K> E-Mail:             rsampson@ucs.orst.edu
K> Source:             whois@nic.ddn.mil
K> Ident:              RSA999
K> Last Updated:       02-Apr-91.

K> No matches found for Robin Sampson from mcimail@nri.reston.va.us
K> No matches found for Robin Sampson from ripe@nic.eu.net

U> service finger@ucs.orst.edu              (use the finger program at
```

```
                                                Robin's computer)

U> print                                        (ask for display of current
                                                KIS search variables)

K> name Robin Sampson
K> service finger@orst.edu
K> raw = FALSE

U > query Robin Sampson                         (search for Robin again)

K> Name:              Robin Sampson             (output from the finger)
K> E-Mail:            rsampson@ucs.orst.edu     (daemon at ucs.orst.edu)
K> Source:            finger@ucs.orst.edu
K> Last Updated:      (unknown)

U> quit                                         (type "quit" to leave KIS)
```

For More Information About KIS

Online Help:	help, ?, and help <command> (e.g., help query)	
Technical Documents:	FTP Host:	nri.reston.va.us
	directory:	rdroms
	files:	KIS.PS KIS.txt
Overview Document	NNSC Internet Resources Guide, Section 4.5	
Discussion Group:	kis-users@nri.reston.va.edu (to subscribe, send e-mail to: kis-users-request@nri.reston.va.edu)	

USENET-ADDRESSES SERVER (U-ASK)

Summary

Retrieves user-ids and e-mail addresses.

This service is based on a simple C program which searches ("greps") through a list of names, user-ids, and e-mail addresses culled from USENET article headers. As of September 1991, it is installed only at pit-manager.mit.edu. The addresses database is updated every month or two.

on the up-side:

- ☐ Searches through this database will often turn up many names not found in the standard white pages services (as in the hypothetical example below).

on the down side (until other sites install such servers...):

- ☐ Not all USENET groups are received at MIT (e.g., regional groups).
- ☐ Many USENET articles are posted with limited distribution, and will not be included in the database.

Access Method

Send an e-mail message to the mailserver using the following syntax:

```
e-mail:        mail-server@pit-manager.mit.edu
subject:       (none needed)
message:       send usenet-addresses/name
```

for example:

```
mail           mail-server@pit-manager.mit.edu
mail text:     send usenet-addresses/Sampson
```

In a few minutes, you should receive a mail file from the mail-server containing all user-ids and e-mail addresses for anyone with the last name of "Sampson" who has posted USENET articles received at MIT:

```
...
robin@paradox.zeno.oz.au          (Robin Sampson)
rsampson@ucs.orst.edu             (Robin Patricia Sampson)
ras@uicvm.uiuc.edu                (Robin Thomas Sampson)
...
```

Local Installation

If you or your users anticipate needing to access this database frequently, you can FTP the database (currently > 2 megabytes in size) and use locally written search programs to search through it:

FTP Host: pit-manager.mit.edu
directory: pub/usenet-addresses
file: addresses.Z

For More Information About U-ASK

If you have problems with the present server at MIT, send mail to postmaster@pit-manager.mit.edu.

PSI WHITE PAGES PILOT X.500 PROJECT

Summary

Retrieves names, user-ids, computer and postal addresses, primarily for administrators and staff of participating institutions.

PSI White Pages is a "pilot project" sponsored by the U.S. Defense Advanced Research Projects Agency and the U.S. Air Force.

X.500 is a strongly hierarchical storage system--entries are arranged in trees, with each entry having "parents" and "children." Such a storage and recovery system is very effective for highly structured organizations.

Access Methods

TELNET: wp.psi.com or
wp2.psi.com
login: fred (fred means "FRont End to the Directory")

Sample X.500 Session (via TELNET)

In the following session, commands which you enter are preceded by "U>" or "U>fred>", and responses from the X.500 directory service are preceded by "X>". Please note that this database is frequently updated. Thus, the information you obtain from a search will differ from this example.

```
U> telnet wp.psi.com
U> login name is fred

U> fred> whois * -org NorthW

X> NorthWest Net (1)      +1 206-562-3000
X> NorthWest Net
X>        Suite 202
X>        15400 SE 30th Plc
X>        Bellevue
X>        WA
X>        98007
X>        A regional network supporting educational/commercial research

X>Name:            NorthWest Net, US (1)

X>Modified: Wed Oct 16  13:27:42 1991
X>        by: Manager, US (2)

X>14 children.
X>
X>        5. Battelle Pacific Northwest Labs
X>        6. Montana State University
X>        7. ND-HECN-North Dakota State University
X>        8. Oregon Graduate Institute
X>        9. Oregon State University
X>        10. Portland State University
X>        11. University of Alaska
X>        12. University of Idaho
X>        13. University of Oregon
X>        14. University of Washington
X>        15. Washington State University
X>        16. Western Washington University
X>        17. Manager
X>        18. Postmaster
```

You can then query X.500 for more information about any one of the individual sites which it has listed.

For More Information About The PSI White Pages Project

There is a great deal of documentation about the PSI White Pages Pilot Project specifically, and X.500 and QUIPU generally.

Online Help:

help, ?, and help <command> (e.g., help query)

Introductory Documents:

You can send e-mail to wp-info@psi.com and to wp-more-info@psi.com

report-1.ps	"White Pages Pilot Project: Status Report, 12/31/89"
report-2.ps	"Realizing the White Pages using the OSI Directory Service, 5/2/90"
report-3.ps	"White Pages Pilot Project: Status Report, 9/10/90"

In addition, PSI's proprietary graphical interfaces to the White Pages are available in source form to interested parties by contacting ssd-info@psi.com.

A brochure on the White Pages is available by sending e-mail to:

wp-brochure@psi.com

The following essay compares the merits of X.500 and Z.39.50:

"Towards Networked Information Retrieval," by Wengyik Yeong, PSI Inc.

FTP Host:	uu.psi.com	
Directory and files:	wp/nir.txt	(ASCII)
	wp/ps/nir.ps	(PostScript)

Online Discussion Groups of X.500 Related Topics

USENET Newsgroups:

comp.protocols.iso
comp.protocols.iso.dev-environ

Mailing Lists:

iso@nic.ddn.mil
isode@nic.ddn.mil

To subscribe to these mailing lists, send a subscription request to:

iso-request@nic.ddn.mil
or
isode-request @nic.dd.mil

INTERNET DIRECTORY SERVICES: WHERE DO WE GO FROM HERE?

The evolution of the Internet, like most other forms of technology, is very responsive to the needs and activities of its users. The demands which you and other Internet users place on the services described in this chapter will be a powerful incentive for the creation of high quality Internet directory services.

It has taken years of development to attain the level of quality we expect from traditional information systems such as telephone directory services. Internet directories are not yet as comprehensive, reliable, or easy to use as they could be, but with strong demand from the user community and rapid response from service providers, such systems could be at hand before the end of the decade.

SECTION 5: EXPLORING NEW FRONTIERS

K-12 Education

Unlike the previous sections of NUSIRG which dealt with general purpose Internet tools and resources, the chapter in this section is directed at special subsets of Internet users: K-12 educators and students.

The Internet activities described in this chapter represent rapidly evolving applications of networks for education and research. K-12 educational users are propelling the use of the Internet to new and exciting frontiers.

Chapter 15 : Using the Global Internet in K-12 Education

"Do you know what it is to be alive?"
"It's when you can do things."
"Is a cat alive?"
"Yes."
"A table?"
"No."
"Why not?"
"It can't move."
"Is a bicycle alive?"
"Yes."
"Why?"
It can go."
"Is a bicycle alive when it isn't moving?"
""Yes."
"Is the moon alive?"
"Yes, sometimes it hides behind the mountains."

From a conversation between
Jean Piaget and a seven year old boy
"The Child's Conception of the World"

THE PURPOSES AND USES OF THIS DOCUMENT

In the past few years, there has been increasing growth in the use of statewide, national and even international networks in K-12 education. This chapter provides an introduction to some of the many Internet resources which are of special interest to K-12 educators, as well as a brief overview of other providers who specialize in K-12 networking.

- ❏ If you don't know anything about such networks, you'll be introduced to some of the exciting educational potentials of computer networks.
- ❏ If your school is contemplating becoming networked, you'll gain a greater understanding of who is providing network services, what they offer, and who to contact for more detailed information.
- ❏ If you're already using computer networks, you'll be directed to a wealth of resources which will allow you to enhance the educational value of networks in your school's curriculum.

Much existing network documentation is designed for users at universities and research institutions. The information that a K-12 audience needs is often buried in a tangle of technical references not directly relevant to your purposes. The goal of this report is to focus on network services that are of immediate value to K-12 education.

This primer will prove most useful to schools which have or are contemplating gaining access to a global network called "The Internet." Nonetheless, many of the resources and references included will be useful for schools using other wide area networks as well, especially if these networks allow direct or gatewayed communication to the Internet.

You'll get the most from this primer if you use it as a K-12 specific supplement to the rest of the chapters of the NorthWestNet User Services Internet Resource Guide (NUSIRG). We suggest that you use the body of the NUSIRG to provide information about how to access and to take full advantage of the major classes of Internet resources (i.e., electronic library resources, electronic books, data bases, and remote computing resources).

INTRODUCTION

Rapid growth is now occurring in computer networks throughout the United States among primary and secondary schools. Many proponents of K-12 education networking have as their goal the connection of a majority of the nation's schools to international computer networks by the end of the decade.

The use of computer networks in primary and secondary education is so new that the typical school is faced with a large number of questions before, during, and after linking to a wide area computer network.

- ❏ Why would our school want to connect to a global computer network?
- ❏ To what networks can K-12 schools connect?
  - ❏ What kinds of educationally relevant services does each network support?
  - ❏ To whom can we turn for user services and technical help?
  - ❏ What kind of hardware and software do we need?
- ❏ To what network should we connect?
- ❏ Are there sources of funding to help defray the costs?

And finally, the most important question is:

- ❏ How can we make the best use of networks to advantage and enhance our educational curriculum?

Because K-12 networking in particular began in earnest only a few years ago and because the networking world in general is evolving so rapidly, definitive answers to the preceding the questions simply do not exist.

In fact, there may never be definitive answers for many of these questions; and that may be a good thing! Unlike many national, federally sponsored networks which have centralized authority and administration, each K-12 school district serves a distinct and unique constituency. This diversity and plurality will be reflected in the strategies adopted by each K-12 school district, from the technical to the pedagogical. No single solution can be right for everyone.

However, sources of information do exist which will help you make informed decisions about how networks can be used to further the educational goals of your school. The rest of this primer will help you to locate and to use the information you need to answer these important questions.

WHY USE COMPUTER NETWORKS IN K-12 EDUCATION?

Computer networks offer tremendous opportunities for K-12 education.

Educational Opportunities For The Students.

For decades, visionaries have been talking about how telecommunications could lead to "a world without borders," a kind of "global village" in which it is as easy to communicate with someone on the other side of the world as it is to visit a next-door neighbor.

Computer networks can help to make the "global village" a reality for you and your students. With a few keystrokes from the classroom computer, your students can:

- engage in global dialogue with students and instructors using electronic mail;
- practice written foreign language skills with native speakers in online discussion groups;
- participate in, or even initiate meaningful projects which are based on collaboration and cooperation of thousands of students throughout the world;
- obtain supplemental instructions from online tutorials or enrollment in distance education courses at American or even foreign institutions; or
- gain "information literacy," a basic understanding of how to navigate in and take full advantage of the networked world into which they will be graduating.

Information and Hardware Resource Sharing

When a school is connected to a full-service, worldwide network like the Internet, it immediately gains access to hundreds of millions of dollars of resources for a very small investment in hardware and software. Networks can be "The Great Democratizer" of educational resources. Even the smallest and most isolated rural school can use the same service enjoyed by the largest and best endowed urban universities.

Examples of what students from a networked school can do from their desks include, but are by no means limited to:

- accessing hundreds of catalogs of the world's best libraries;
- instantaneously copying educationally rewarding software and documents from file archives such as Bulletin Board Services;
- exploring and manipulating complex databases of real research data containing information from agricultural markets, global climate simulations, or even space missions to other planets;
- enrolling in supercomputer training programs which give students access to the world's most powerful computers.

In Service Education and Teacher Enrichment

The teachers in primary and secondary schools sometimes feel isolated from the peers, professors, and facilities they had learned to depend on throughout their training in colleges and universities. By using computer networks, K-12 educators can:

- continue their professional contacts formed during their college or university education can
- increase the number and diversity of and educational resources they use while teaching,
- participate in continued education by enrollment in universities and colleges which offer distance education programs via networks;
- and, of course, utilize all of the resources listed in the two sections above.

A Quick Caveat

Appropriately deployed and utilized, computers and computer networks can contribute significantly to improvements in America's educational system. With all the ballyhoo surrounding computers in the modern world, it's crucial to remember that although computer networks do have tremendous educational value, taken alone they will not be the panacea for America's educational system.

The quality of life in our world is more dependent upon the development of day-to-day, interpersonal skills, and on nurturing basic skills such as "reading, writing, and arithmetic". Computers and computer networks are a blessing only insofar as they further this basic learning process. The most important assets of schools are skilled, dedicated teachers, and parents who have a supportive enthusiasm for their children's education. Computers are--and should always be--a tool, a supplement, not a replacement, for the human resources of our schools.

Happily, most applications of computer networks in education have taken these considerations into account. In summary, if used intelligently and with a sensitivity to the student or teacher as a person, networks can deliver such educational benefits that every K-12 school should consider joining a computer network.

A Sampler of Projects in K-12 Networking

Here we describe a few of the many current K-12 projects using computer networks. These projects are included to give you an idea of the scope and breadth of network activities available to you and your students. You are likely to find that the people involved in these projects will enthusiastically share their expertise and resources, particularly if you are interested in initiating similar efforts.

Disabled Data Link Group and Chatback:

DDLG and the Chatback Project for Children currently involves 60 schools supporting the use of networks by disabled students, in an effort to assist those with special needs.

Cliff Jones

e-mail: 2:245/71 (FidoNet)
Cliff.Jones@f71.n254.z2.fidonet.org (Internet).

EARTH KIDS:

A non-profit international kids organization to promote communication about and for hands-on, community based ecological projects around the world. For more information, contact:

Marshall Gilmore
(503) 363-1896.

e-mail: 1:105/606 (FidoNet)
Marshall.Gilmore@f606.n105.z1.fidonet.org (Internet);

NEWSDAY

A multi-curricular project in which students in each participating school produce a local newspaper based on the news dispatches submitted on the NEWSDAY news wire by student correspondents. Students become news gatherers and reporters, editors, layout and graphics artists, and publishers. Participation on a national and international scale leads to understanding of broad issues which transcend local concerns. This project can involve your students in weeks of cross-curricular activity.

Al Rogers
FrEdMail Foundation
PO Box 243, Bonita, CA 91908
(619) 475-4852

e-mail: SDCOE!BONITA!AROGERS (FrEdMail)
arogers@fred.org (Internet)

Project Zero-G:

Students, teachers, and adult experts from outside schools will examine aspects of our everyday life and consider how they would have to be redesigned to function in the zero-gravity environments of orbiting space stations like SkyLab and the Soviet Solyut. This can include the design of everyday objects (silverware, shelves, rooms, buildings), and the design of everyday activities (education, sports, transportation vehicles), including the re-design of social interactions. This project can provide an extended global network experience for students and teachers in many curricular areas: science, social studies, writing, problem solving, mathematics, art and design. The final designs will be submitted to NASA as a technical report, and will assist NASA engineers in the design of the new American space station.

Jim Levin
e-mail: jim-levin@uiuc.edu (Internet)
UIUCED2!JLEVIN (FrEdMail)

TO WHAT NETWORKS CAN K-12 SCHOOLS CONNECT?

This section tells you to how to get information on the major players in K-12 networking and what they have to offer. Even if your school is already connected to a network, you should read this section to find out if there are additional networking options which can either supplement or replace your current setup.

Overview

Like universities, K-12 schools have many choices for network connectivity:

- ☐ Internet networks, like the National Science Foundation (NSF)-sponsored regional networks.

The next four network options include some networks which are actually part of the Internet, and others which are not:

- ☐ Statewide networks
- ☐ Non-profit cooperative networks
- ☐ Commercial networks
- ☐ "Public Data Networks"

Each networking option has unique strengths and weaknesses. To help you make an informed decision, this section summarizes what services each of these categories of network providers typically can offer K-12 schools. Contact names, addresses, and phone numbers for many network providers are listed at the end of this report so you can communicate with representatives of those networks in which you are especially interested.

Overview of "The Internet"

The Internet is a global network of networks. As of September 1991 it connected an estimated 5,000 networks, 350,000 host computers, and 3,500,000 people. These already enormous numbers are continuing to grow exponentially every year.

All Internet networks, everywhere in the world, use the same "standards" for communicating, called "The TCP/IP Internet Protocols." All that you need about TCP/IP right now is that it makes an enormous variety of services available to the user, and that you can communicate to every computer on the Internet in the same way, no matter what or where it is. Within the United States, there are a number of regional and national networks which use the Internet standards. Detailed information about Internet networks is provided in Chapter 2 of NUSIRG.

Of particular interest to K-12 educators is "The National Science Foundation Network" (NSFNET), a high speed, state-of-the-art network which was created specifically to support the use of computer networks in education and research.

By time you read this, NSFNET and similar national Internet networks may have been renamed "The National Research and Education Network" (NREN). In November of 1991, President Bush signed the High-Performance Computing Act which authorized the creation of a permanent NREN. The bill allocated $2.9 billion over the next five years to enhance the United States' high-performance computing and communications infrastructure. Please see the section "For More Information" on how to keep abreast of NREN developments and funding opportunities.

Regional Internet Networks

The national NSFNET itself is a framework, or "backbone" network, currently linking NSF-sponsored regional networks distributed throughout the nation. From these NSFNET backbone sites, each regional network branches off to serve many sites throughout a specific geographic region.

Some regional networks service a geographically small but densely computerized portion of a single state (e.g., BARRNet for the San Francisco and Silicon Valley area), while others help bring large, sparsely populated regions together into the network world (e.g., NorthWestNet, which serves the United States from Alaska, south to Oregon, and east to North Dakota).

Many K-12 schools are already enjoying the benefits of direct connection to the Internet through regional Internet networks.

K-12 Users and The Internet

Here is what regional Internet networks have to offer everyone, including K-12 users.

Resources And Capabilities:

- ❏ global electronic mail
- ❏ global discussion groups
- ❏ large archives of free software and documents
- ❏ free "electronic books"
- ❏ subscriptions to "electronic journals"
- ❏ computer "white pages" and "yellow pages" to find people and resources on the Internet
- ❏ ability to login to remote computers to access:
  - ❏ hundreds of electronic library catalogs
  - ❏ a wide variety of databases for teaching and research
  - ❏ supercomputers for high speed calculations, state-of-the-art graphics, and other high technology applications

In summary, most kinds of resources that are available on computer networks are available through the Internet. In terms of comprehensive networking capabilities, the Internet has no match.

Internet Support and Training

- ❏ Almost all regional Internet networks have central Network Operations Centers (NOCs) to handle most of the day-to-day maintenance of the network as a whole. Each NOC site within a regional has staff who are devoted to technical maintenance of local sites.
- ❏ Most regionals have, or are planning, central Network Information Centers (NICs) which provide basic documents and other user services support for network users. A few regionals, like

NorthWestNet, have a well-established track record in providing annual meetings, training programs, and user guides for member institutions.

K-12 Specific Internet Support and Services

The Internet offers a rapidly growing variety of resources specifically designed for use in K-12 education including:

- ☐ databases developed especially for K-12 education (e.g., Spacelink)
- ☐ documentation for K-12 networking
- ☐ summer programs at NSF-sponsored supercomputer sites for students and teachers (e.g., Cornell National Supercomputer Facility, National Center for Supercomputer Applications, National Energy Research Supercomputer Center, and Pittsburgh Supercomputer Center)
- ☐ nationwide Internet directory services specifically for K-12 educators should be available by early 1992 through Michigan's Merit network

For More Information:

Addendum 1A lists the names and contact information for the NSF-sponsored regional Internet networks.

State Networks

Another promising source of network connectivity for K-12 schools are statewide networks. A survey of statewide networks released in April, 1991, reported that most all of the 50 states either had established, or were about to initiate, state networks which would include K-12 connectivity as a central goal (Kurshan, 1991).

Resources and Abilities:

Every state network is different. The technical sophistication of statewide networks varies tremendously, between and within states; in some states, connections from K-12 schools are made through dial-up modems, while other states use more modern technologies such as high speed (T1) backbones, fiber optics, point-to-point microwave, and satellite links. Some statewide networks feature direct K-12 Internet access.

Most statewide networks offer electronic mail; though in some cases, this is still restricted to administrative purposes.

Other general network services offered by some, but not all statewide networks include:

- ☐ online dictionaries and encyclopedias
- ☐ discussion groups
- ☐ library catalogs
- ☐ bulletin board services for announcements and software
- ☐ access to the Internet and Internet services

K-12 Specific Support and Services From Statewide Networks

Since many state networks have been (or are being) developed at least in part, to support K-12 education, some offer services of special interest to K-12 students and educators.

- ☐ distance education programs through universities and colleges

☐ professional employment referral services
☐ network distribution instructional video services
☐ systems to teach educators how to use networks
☐ educational databases
☐ online "test-banks"
☐ a number of state networks are working on "menu driven" Internet access utilities to make the Internet easier for K-12 use (e.g.,California, Texas, Florida, and Virginia)

If you are in a position to make or influence decisions about the design and implementation of your state network, you can get a wealth of useful information by comparing notes with peers working with other state networks. Comprehensive overviews of state networks can be found in McAnge et al. (1990), and Kurshan (1990b, 1991)

For your convenience, addendum 2 lists the names and contacts for all statewide networks discussed in Kurshan's 1991 report.

Not-For-Profit Cooperative Networks

There are many national and even international not-for-profit, cooperative computer networks which are particularly appropriate for K-12 educational networking.

Many not-for-profit cooperative networks offer a low cost and effective basic network option for K-12 schools. These networks are particularly valuable for K-12 sites which cannot, or choose not to, connect directly to the Internet, or whose state networks are still embryonic. But even schools which currently employ other network options can gain a great deal by using these services.

An especially promising and widespread non-profit network for K-12 education is K12Net, which is an offshoot of a more general purpose network called FidoNet. A brief description of FidoNet and K12Net will give you an idea of how some of these networks work, and a general idea of the kinds of services typically offered by non-profit networks generally.

FidoNet

FidoNet is an international network with 10,000 electronic "Bulletin Board Systems" (BBS's) in more than 50 countries. It is a "grassroots," decentralized, non-profit network operated entirely through volunteer effort.

A BBS can be run with minimal hardware and software requirements. All you need is a telephone, a modem, a personal computer, a hard-disk, and free FidoNet software. A good file backup system is of course a wise investment as well.

K12Net

K12Net is a spin-off of FidoNet designed specifically for K-12 students and teachers. The goal of K12Net is to create a demand for networking services within the K-12 education community by making it as easy as possible for K-12 schools to start networking. If you have access to a telephone, a modem, and a computer, you can dial up a FidoNet or K12Net BBS, and start exploring the world of K-12 networking immediately. K12Net is an accessible, hands-on network-based technology simple enough for students to learn and even operate.

K12Net offers the following services:

☐ global electronic mail, which can be sent to and received from the Internet
☐ K-12 oriented discussion groups

❏ an extraordinarily rich archive of K-12 oriented educational software (currently for MS-DOS computers only), documents, and other information available at 19 major K12Net BBSs.

With 10,000 FidoNet sites around the world, chances are good that K12Net can be reached from your school by either free or low cost phone calls.

Contact information for a number of the more widespread, K-12 oriented cooperative networks is given in addendum 3, including information for the main regional K12Net system operators, and the phone numbers for calls to their modem-accessible BBS's.

National Public Telecommuncations Network

The National Public Telecomputing Network (NPTN) is a not-for-profit organization dedicated to establishing and developing free, computerized information and communication services for the general public. NPTN has just been started. As of September, 1991 there were four sites in the Midwest, but by time you read this guide, NPTN may be an international network services provider.

Current services are based on Bulletin Board Services which provide a variety of information of interest to the general public.

Contact information on NPTN is given in addendum 3.

Commercial Networks

There are many commercial networks, some of which have targeted their services very specifically at the K-12 market. Most all commercial networks offer:

❏ electronic mail
❏ conferencing systems

Commercial networks often provide many other services of interest to K-12 educators such as online encyclopedias. Some commercial networks use Internet protocols, and thus allow full access to the Internet services described earlier.

See Kurshan (1990a) and Quarterman (1990) for overviews and contact information for commercial network providers generally. Addendum 1B gives contact information for several commercial Internet network providers.

Public Data Networks

"Public data networks" tend to be relatively specialized databases which are often accessed by modem calls.

McAnge et al. (1990) and Quarterman (1990) provide an introduction to a variety of such services.

TO WHAT NETWORK SHOULD WE CONNECT?

As the previous discussion demonstrates, K-12 schools can obtain network connectivity from a wide variety of providers. How does one choose which network service is best?

If your school hasn't yet been connected to an external network, you might think that the most basic network services, such as electronic mail, would be adequate. But judging from the experience of universities and research institutions, it is likely that once you've made a connection to a global network, the use of computer networks by students and teachers at your school will grow rapidly.

If you want to be ready for this growth, you should choose a service which offers flexibility for accommodating this growth. If at all possible, you should you choose a service which allows you full access to the Internet.

Here are some of the many considerations which have to be taken into account to determine what option is best for your purposes.

- ☐ How much computer experience do your teachers and students already have?
- ☐ What sort of computer equipment does you school already have?
- ☐ What are the costs of obtaining the hardware required for connectivity and the commercial provider's annual fees?
- ☐ Do you need full service connectivity immediately, or would access to electronic mail and conferencing be sufficient to get your staff and students comfortable with networking?
- ☐ Are there any legislative restrictions which make certain options difficult?
- ☐ How well will a particular option scale as more demands are placed on it by newly enthusiastic students and teachers?

ARE THERE SOURCES OF FFUNDING TO HELP DEFRAY THE COSTS?

Full or partial funding for K-12 networking, ranging from the construction of statewide networks as a whole to the purchase of equipment for individual K-12 schools has come from a wide variety of sources.

- ☐ state departments of education, energy, or science
- ☐ federal agencies (DOE, NSF, and USDE in particular)
- ☐ private and public universities
- ☐ national and regional telecommunications companies (GTE, SNET, USWest)
- ☐ computer companies (Apple, IBM)
- ☐ contributions from various foundations and individuals
- ☐ K-12 school and school district budgets

Financial support for K-12 networking should be justifiable to any of the sources to which you normally turn for any other educational project funding.

A new and particularly notable source of funding specifically directed at K-12 networking is The Annenberg Foundation / Corporation for Public Broadcasting project. Under this project up to $5 million per year will be provided for educational applications of telecommunications for a period of 12 years. As of September 1991, there were plans to begin accepting grant proposals for K-12 networking starting in late 1991. For more information, contact:

Michael Strait, Ph.D.
Project Officer for Research and Evaluation
Corporation for Public Broadcasting
901 E. Street NW
Washington DC 20004-2006
tel: (202) 879-9646
e-mail: strait@umuc.umd.edu

USING GLOBAL NETWORKS FOR K-12 EDUCATION

This section of the document will give brief, K-12 oriented overviews of each of the major kinds of applications you'll encounter when using computer networks.

Because the Internet provides the greatest variety of resources (and because it would not be possible to explain the use of these resources on every kind of computer network in this brief document), all examples provided here use the Internet. Nonetheless, the general principles which are illustrated here should be useful even if you are not yet using the Internet.

Most of the entries in this section have the following structure:

a. A quick description of the resource.

b. A real, K-12 oriented example of an Internet application.

c. pointers to K-12 specific information about using the resource on the Internet.

Certain services which require actual connection to computers (like electronic library catalogs) can only be done through the Internet or very occasionally by using a modem for dial-in access. Much more comprehensive treatment of each of these resources can be found in the resource specific chapters of the NorthWestNet Users Service Internet Resource Guide.

Electronic Mail (or E-mail)

What is Electronic Mail?

Electronic mail (usually referred to as "e-mail") is the most basic service offered by computer networks.

E-mail is very similar to regular postal mail, except that it is sent electronically through a computer network and it arrives much faster. With e-mail, you can send messages to anyone on a network, just like you can send a letter to anyone who has a postal address.

The most exciting uses of e-mail in K-12 education are for communication and collaboration between and among students and teachers at distant schools.

A Specific K-12 Application of Electronic Mail on the Internet

E-mail can be used to send messages to computers on the network which will automatically send back information that you have requested. Such computers are called "mail servers."

For example, you can send mail to a computer service run by the Oregon Extension Service called "Almanac." This resource contains a wide variety of educationally valuable materials such as "electronic books," and an enormous amount of information from the Department of Agriculture. You can have this information sent to you simply by sending an e-mail message request.

In this example, we'll send a message to Almanac, requesting a copy of the Declaration of Independence.

Step 1. Start your mail program.

Step 2. Address a message to the following Internet user-id and address. Note: If you are not on an Internet computer, you will probably have to add additional information. Ask your colleagues if they know how to send mail to the Internet from your site)

almanac@oes.orst.edu

Step 3. You don't have to include anything in the subject line.

Step 4. In your mail editor, type the following message:

send guten dec-of-ind

where "guten" is short for "Project Gutenberg," a non-profit organization dedicated to creating free electronic versions of the world's great literature, and "dec-of-ind" is the file name for the Declaration of Independence.

Step 5. Send the mail message.

Step 6. In a short while, you should receive e-mail from Almanac. If you did everything right, it will be a copy of the Declaration of Independence! If you made a mistake, the e-mail message from Almanac will give you a hint about what you did wrong and directions for how to send a correct request.

If you want more information about Almanac, you can send an e-mail message to Almanac containing one of the following messages:

send guide	(to get a copy of the Almanac Guide)
send topic catalog	(to get a copy of Almanac's holdings)

Other Applications of Electronic Mail

E-mail is also used for accessing many of the network services described in the following sections of this document, such as subscribing to electronic journals or participating in online discussion groups.

Online Library Catalogs

What Are Online Library Catalogs?

Online library catalogs (more precisely known as "Online Public Access Catalogs", or "OPACs" for short) are electronic versions of library card catalogs. OPACs have been installed at hundreds of the world's libraries and are generally free of charge for anyone with an Internet connection.

An Example K-12 Specific OPAC Application

As an example of the potential of the Internet to provide "real-time" access to remote knowledge bases and informational resources, allow me to relate this personal episode. I was trying to compose text containing a K-12 specific OPAC application when I realized that I was just about to run through a good example while writing this chapter.

I am word processing this document on a Macintosh SE at my home in Seattle. I need to find references on the subject "distance education" for the bibliography, but it's 2 am, and all of the libraries in Seattle are closed. But because I have an Internet connection through the University of Washington, I can connect to any one of 200 OPACs in the United States and do a literature search from my home.

I've just entered the following command on my computer

```
telnet pac.carl.org
```

and in a few seconds I'm connected to the Colorado Association of Research Libraries (CARL) in Boulder, Colorado, about 1,000 miles away from my house. Because I'm doing this through the Internet, I'm not being charged a penny for the connection, nor was I charged for the connection I made to a database in England an hour ago. The cost of these connection services are defrayed in part by the National Science Foundation and in part by the dues and service fees paid by the members and partners of NorthWestNet.

CARL asks me what kind of terminal I'm using. To be certain that all of the NUSIRG examples work with the simplest equipment, I'm purposely using a basic terminal emulation program. I select HARDCOPY, which is the appropriate choice for "dumb" terminals without any fancy features.

An easy to use menu has appeared on my screen, and I've selected the library catalog option. CARL offers many other interesting databases, but I don't have time to get distracted. The names of 21 libraries in the state of Colorado appear on my screen, and I select the State Department of Education Catalog.

Now I'm given a number of options for the kind of search I want to do. I type "w" for "word", and then I type "Distance Education." In two seconds, CARL tells me that it has found 16 books with the words "Distance Education."

As it turns out, the very first reference in the list is one that someone in an online discussion group had asked about earlier in the day. The person wasn't sure of the title, so I'm going to send them an e-mail message giving them the full reference.

OPACS of Special Interest to K-12 Education

Every OPAC has something to offer K-12 education. Most of the best OPACs are only accessible through Internet connection, although a few statewide networks have started providing OPAC services via modem connections. A more complete discussion of OPACs is provided in Chapter 12 of NUSIRG.

File Archives

There are thousands of computers in the world which contain "file archives" from which files can be copied to your computer for your own use.

K12Net Libraries

Very useful file archives for K-12 education are maintained in the "K12Net Libraries" throughout the world. These K12Net libraries contain thousands of files on a wide variety of subjects including:

- ❏ educational software
- ❏ course outlines and other material for curricular development
- ❏ documents relating to education generally, including distance education and government publications

Document files can be used on most any kind of personal computer. Most of the software currently held in the K12Net Library is for MS DOS based machines, but there are plans to start adding materials for other PC's such as the Macintosh, Apple II's, and Amigas.

To access the K12Net library, all you need is a phone, a modem, and a personal computer with simple telecommuncations software. To locate the K12Net Library nearest you, get in touch with one of the K12Net contacts listed in addendum 3.

Interactive Bulletin Board Services (BBSs)

Bulletin Board Services are computers which contain information, training, and files which you can copy for your own use.

K12Net / FidoNet

All of the K12Net and Fidonet nodes are BBSs. To find the site nearest you, contact one of the main K12Net sites listed in addendum 3.

National Public Telecommuncations Network BBSs

There are currently four NPTN sites which are accessible by modem calls or with the Internet TELNET protocol.

Cleveland Free-Net	Cleveland, Ohio
modem:	(216) 368-3888
telnet:	freenet-in-a.cwru.edu freenet-in-b.cwru.edu freenet-in-c.cwru.edu
Youngstown Free-Net	Youngstown, Ohio
modem:	(216) 742-3072 telnet: yfn.ysu.edu
TriState Online	Cincinnati, Ohio
modem:	(513) 579-1990
telnet:	tso.uc.edu
Heartland Free-Net	Peoria, Illinois
modem:	(309) 674-1100
telnet:	heartland.bradley.edu

NPTN plans to establish additional sites in the following communities: Buffalo; Chicago; Denver; Lorain County, OH, Los Angeles; Minneapolis/St.Paul; Portland, OR; Philadelphia; Summit, NJ; Washington, D.C.; Helsinki, Finland; Singapore; and Wellington, New Zealand.

Online Discussion Groups

Online discussion groups allow you to communicate with people throughout the world who share a specific interest.

By having distinct names and limited scopes, discussion groups enable highly focused, topic-specific discourses. So even though the worldwide networks are huge and used by people with many diverse interests, discussion groups make the network world a more homey place.

Once you find groups which suit your needs, you can read material "posted" by other people, you can comment on other people's postings, or you can contribute new messages to the group.

There are many different discussion group services. These differ in how they work and in how they are named.

For details on how to use two widely used discussion group services, USENET and LISTSERV, consult Chapters 7 and 8 of NUSIRG.

K-12 Specific Discussion Groups

Because each discussion group service features a huge number of topic specific groups, it is sometime hard for new users to know which groups are most likely to be useful. For example, the BITNET LISTSERV service offers nearly 3,000 groups! To help get you started, Tables 1, 2 and 3 give a sampling of LISTSERV discussion groups, Internet interest groups, and USENET newsgroups which are most likely to interest K-12 educators.

K-12 specific discussion groups are a great place to keep in touch with what other K-12 educators are doing with computer networks. Many of these groups are often used like curriculum development meetings in a world-wide school.

Use Tables 1, 2, and 3 as K-12 specific resources when you follow the detailed instructions on how to use discussion group services in the earlier chapters of NUSIRG.

Electronic Journals

Electronic Journals are like regular magazines. They feature submitted articles which are reviewed, edited, and placed in an organized format within a computer file. The big differences are that the journals are sent to your computer and that you don't have to pay personally for your subscription.

Although the number of electronic journals is currently small, it has been predicted that their number and their impact will expand greatly in the next few years.

An Example of How to Subscribe to an Electronic Journal

To subscribe to an electronic journal, you send an e-mail message to an Internet address. In some cases, the user-id you are sending mail to is that of a real person, in which case you can write a regular English language letter requesting a subscription. In other cases, you will be sending a message to a computer program which will read your message and will expect the message to be of a very specific format.

For example, to subscribe to the "Distance Education Online Symposium" (which often features articles relevant to applications of networks to K-12 education), you would send an e-mail message as follows:

```
mail:    listserv%psuvm.bitnet@cunyvm.cuny.edu
subject: (none needed)
         SUB DEOS your-full-name
```

In less than a day, you should receive a message saying that you have been subscribed to this electronic journal with information on how to obtain back issues by e-mail.

Once you have been subscribed, you will receive a copy of the journal once every month.

Electronic Journals of Special Interest to K-12 Education

Table 4 lists a number of electronic journals which are of potential interest to K-12 educators. Please refer to Chapter 9 of NUSIRG for more information about Electronic Journals.

Online Databases

There are several Internet accessible online databases which are of particular interest to K-12 educators. To use these databases, you need to know how to use TELNET, which is explained in Chapter 5 of NUSIRG.

A large catalog of many other online databases is provided in Chapter 12 of NUSIRG.

PENpages: Contains online articles and brochures on agriculture, careers, health, consumer issues, and weather; from The Pennsylvania State University. vt100 terminal emulation recommended.

Access:
telnet: psupen.psu.edu
User-name: PNOTPA

e-mail: support@psupenn.psu.edu

Art Hussey, Assistant Director
Computer Services
Office of Administrative Services
The Pennsylvania State University
405 Agricultural Administration Building
University Park, PA 16802
(814) 863-3449

SPACELINK: A very easy to use database and interactive system containing information about NASA and NASA activities. Includes a large number of possible curricular activities for elementary and secondary science classes. A tremendously valuable resource for elementary and secondary science teachers.

Access:
telnet: 128.158.13.250
username: newuser
password: newuser

Supercomputer Training Opportunities for K-12 Students and Teachers

Several of the NSF sponsored supercomputer sites have established programs for K-12 students.

☐ Cornell National Supercomputer Facility
(607) 255-8686
☐ National Center for Supercomputer Applications
(217) 244-1100
☐ National Energy Research Supercomputer Center
(415) 422-1544

K-12 Network Etiquette

Just as we unconsciously internalize standards of etiquette in our everyday behavior, there are many issues of network etiquette which may not be apparent to new users of network services, especially among K-12 students. As Jack Crawford, one of the main forces behind "K12 Net," recently wrote, "the ability to keep our echoes animated, well behaved, and oriented toward K-12 curriculum increasingly depends upon the zealousness, energy and skill of moderators."

Before starting a K-12 networking project with students, it would be wise to read some of the literature on "network etiquette." Quarterman (1989 and 1990) provides a particularly good overview of the issues involved in polite and ethical use of computer networks. Passages in Chapter 3 of NUSIRG, and references in that chapter also deal with some of the etiquette issues involved in electronic mail communications specifically.

"Distance Education" Programs For K-12 Educators

There are numerous opportunities for K-12 educators and even students to enroll in courses at other institutions around the world.

Such "Distance Education" programs are the electronic equivalent of "correspondence schools," but with a major difference. "They often allow real time, interactive contact with instructors and other students via computer networks with electronic mail or even two-way video.

Moore and Thomson (1990), Moore et al. (1990) discuss distance education generally. Information on specific statewide programs for K-12 educators can be found in Kurshan (1990b). Very up-to-date information can be obtained by subscribing to one of several LISTSERV discussion groups or electronic journals included in Tables 1 and 4.

For More Information On K-12 Networking

The best information on K-12 networking can be obtained by diving headlong into the active and exciting discussions taking place on computer networks throughout the world. Several of these discussion groups have been described in this chapter. Subscribe to some of the K12Net, USENET, and LISTSERV groups, and you will be able to keep posted on collaborative projects of many sorts which will be best suited to your particular educational curriculum.

Admittedly, this strategy presents a bit of a "bootstrapping" problem for those of you who do not yet have network access, so here's a list of printed references, journals, and professional societies which are of special interest to K-12 educators.

Books and Articles

Beals, D.E. 1991. "Computer mediated communication among beginning teachers." T.H.E. Journal, 18(9), 74-77.

Carlitz, Robert D. 1991. "Common Knowledge: Networks for Kindergarten Through College." Educom Review 26(2):25-28.

Clement, John. 1990. "Networking for K-12 education: bringing everyone together." Available from Educom.

Kurshan, Barbara. 1990a. Home Market for Educational OnLine Services: Growth of Market and Strategies for Expansion (available from the author; see contact information at end of addendum 2).

Kurshan, Barbara. 1990b. "Statewide Telecommunications Networks: An Overview of the Current State and the Growth Potential." (available from the author; see contact information at end of addendum 2).

Kurshan, Barbara. 1991. "Statewide Education Networks Survey Results." (available from the author; see contact information at end of addendum 2).

Moore, M.G., Thompson, M.M. 1990. "The effects of distance learning: a summary of literature." Pennsylvania State University.

Moore, M.G., Cookson,P. J. Donaldson, and Quigley, B.A. 1990. Contemporary issues in American distance education, Pergamon Press, New York.

Phillips, G.M., Santoro, G.M., & Kuehn, S.A. 1988. "The use of computer--mediated communication in training students in group problem-solving and decision-making techniques." American Journal of Distance Education, 2(1): 38-51.

Quarterman, J. S. 1989. "Etiquette and Ethics," ConneXions--The Interoperability Report 3(4):12-16.

Quarterman, J. S. 1990. "The Matrix: Computer Networks and Conferencing Systems Worldwide." Digital Press, Bedford, MA.

Roberts, N., Blakeslee, G., Brown, M., and Lenk, C. 1990 . "Integrating Telecommunications into Education." Englewood Cliffs, NJ: Prentice- Hall.

"Rural America at the Crossroads: "Networking for the Future." U.S. Congress Office of Technology Assessment."April 1991. (S/N 052 003 0122806; available in government document repositories, or through your legislator.

"Linking for Learning: "Computer-and-Communications Network Support for Nationwide Innovation in Education." June 1991. The National Science Foundation's Directorate for Education and Human Resources.

Printed Journals

The following printed journals are particularly informative for K-12 educators using computer networks:

American Journal of Distance Education
Classroom Computer Learning
Computing Teacher
Educational Technology
EDUCOM Review
Electronic Learning
Journal of Computers in Mathematics and Science Teaching
Learning Tomorrow
Research and Education Networking
T.H.E.Journal
University Computing Times

Periodic Conferences

CAUSE
Consortium for School Networking
EDUCOM
International Conferences on Technology and Education
International Council for Distance Education Conferences
International Symposia on Telecommunications and Education

NorthWestNet
SHARE
USENIX

Organization

EDUCOM
1112 16th Street, NW
Suite 600
Washington, DC 20036
phone: (202) 872-4200.

TABLE 1: LISTSERV DISCUSSION GROUPS RELEVANT TO K-12 EDUCATORS AND STUDENTS

For more information on using LISTSERV, please refer to Chapter 8 of NUSIRG.

NOTE: The BITNET addresses listed below need to be modified and expanded to be used on other networks. For example here's how you would address a message to KIDCAFE from the Internet:

kidcafe%ndsuvm1.bitnet@cunyvm.cuny.edu

The underlined portion could be added to any of the names below. Notice also that there is a "%" between kidcafe and ndsuvm1, instead of an "@" sign. For more information on why this modification of BITNET addresses is necessary and how it works, refer to passages in Chapter 3 of NUSIRG which deal with electronic mail gateways.

List Name	BITNET address	General Topic Area, and Brief Description of List
		Student Oriented Lists
KIDCAFE	@ NDSUVM1	KIDCAFE Youth dialog
KIDS-ACT	@ NDSUVM1	KIDS-ACT What can I do now?
SCOUTS-L	@ NDSUVM1	Youth groups including Boy and Girl Scouts, etc.
SEAC-L	@ UNCVX1	Student environmental activism
SGANET	@ VTVM1	Student government global mail network
		Education Oriented Lists
EDNET6-L	@ IUBV1	K-12 Network Management Plan
KIDPLAN	@ NDSUVM1	KIDPLAN KIDS-92 Planning
KIDS-92	@ NDSUVM1	KIDS-92 Project List
K12STCTE	@ BITNIC	K-12 Steering Committee
RESPONSE	@ NDSUVM1	Response to KIDS-92
VT-HSNET	@ VTVM1	VT K-12 School Network
		Hobbies and Recreation
CHESS-L	@ GREARN	Chess discussion and organization of tournaments
DJ-L	@ NDSUVM1	Campus radio DJ's technical discussion
GAMES-L	@ BROWNV1	Computer games of any sort
SCUBA-L	@ GUV1	All aspects of scuba diving
SHOGI-L	@ TECHNION	Strategic board game, Shogi
		Subject-Specific Lists Relevant to K12 Education
BIOSPH-L	@ UBV1	Anything relevant to planetary ecology
CHEMED-L	@ UWF	Chemistry education
CW-L	@ TTUVM1	Computers and writing
DISARM-L	@ ALBNYVM1	Discussion of global disarmament
FILM-L	@ VMTECMEX	Film; art, entertainment, techniques equipment

HISTORY	@	UBV1	(Peered) History discussion list
INTERCUL	@	RPIECS	Study of intercultural communication
LITERA-L	@	TECMTYV1	Literature in English & Spanish
LITERARY	@	UCF1V1	Discussions about literature
LLTI	@	DARTCMS1	Language learning and technology international
MARINE-L	@	UOGUELPH	Marine studies / shipboard education
MCLR	@	MSU	Midwest consortium for Latino research
MULTI-L	@	BARILV1	Language and education in multilingual settings
MUSIC-ED	@	UMINN1	Music education
NATIVE-L	@	TAMVM1	Issues pertaining to aboriginal people
PEACE	@	INDYCMS	Peace studies
PHYSHARE	@	PSUV1	Sharing resources for high school physics
RURALDEV	@	KSUV1	Community and rural economic development
SAIS-L	@	UNBVM1	Science awareness and promotion
SCIMATHL	@	PSUV1	Science, math and engineering education
SCREEN-L	@	UA1V1	Discussion of TV from a pedagogical perspective
SHAKSPER	@	UTORONTO	International electronic Shakespeare conference
SPORTPSY	@	TEMPLEV1	Exercise and sports psychology
TECHED-L	@	PSUV1	Employment, training and literacy issues
TESL-L	@	CUNYV1	Teaching English as a second language
URBAN-L	@	TREARN	Urban planning information exchange

Special Education / Talented and Gifted Education

BEHAVIOR	@	ASUACAD	Behavioral and emotional disorders in children
BLIND-L	@	UAFSYSB	Computer use by and for the blind
COMMDIS	@	RPIECS	Speech disorders
DEAF-L	@	SIUCVMB	Deaf list
EDINFO-L	@	IUBV1	Educational information
L-HCAP	@	NDSUVM1	Technology for handicapped, funding info, etc.
SPCEDS-L	@	UBV1	SUNY/Buffalo special education (students)
TAG-L	@	NDSUVM1	Talented and gifted education

Teacher Oriented Lists

BIOPI-L	@	KSUV1	Secondary biology teacher enhancement
TEACHEFT	@	WCU	Teaching effectiveness

Educational Uses of Computers and Networks

CNEDUC-L	@	TAMVM1	Computer networking and education, esp. K-12
CNIDIR-L	@	UNMV1	Coalition for Networked Information
CONFER-L	@	NCSUV1	Academic interactive conferencing
COSNDISC	@	BITNIC	Consortium for School Networking
DEOS-L	@	PSUV1	The Distance Education Online Symposium
DEOSNEWS	@	PSUV1	The Distance Education Online Symposium
DISTED	@	UWAV1	Journal of Distance Ed. and Communication
EDTECH	@	OHSTVMA	Educational technology
EDUTEL	@	RPIECS	Education and information technologies
ETDIR-L	@	UBV1	Educational technology research & development
MEDIA-L	@	BINGVMB	Educational communications for media services
PACS-L	@	UHUPVM1	Public-access computer systems forum

SCIT-L	@ QUCDN	Studies in communication and info. technology

Software for Education

ACSOFT-L	@ WUVMD	Academic software development
PCSERV-L	@ RPIECS	Public domain software servers

Hardware and Operating System Oriented Lists

APPLE2-L	@ BROWNV1	Apple II List
COCO	@ PUCC	Tandy color computer List
COMMODOR	@ UBV1	Commodore computers discussion
I-AMIGA	@ UTORONTO	(Peered) Info-Amiga List
I-IBMPC	@ UIUCVMD	IBM PC discussions
IBMPC-L	@ UGA	(Peered) INFO-IBMPC Digest
INFO-APP	@ NDSUVM1	Apple II series user's mailing list
INFO-MAC	@ UIUCVMD	(Peered) INFO-MAC Digest
INFO-PC	@ IRLEARN	Distribution of Info-IBMPC
MAC-L	@ YALEV1	Macintosh news and information
MACMAIL	@ UTORONTO	MAC Mail
MACNET-L	@ YALEV1	Macintosh networking issues
MACPROG	@ WUVMD	Macintosh programming
MACSYSTM	@ DARTCMS1	Advice about Macintosh operating system
NEXT-L	@ BROWNV1	(Peered) NeXT computer list
PC-EVAL	@ IRLEARN	Personal Computer evaluation
PC-L	@ UFRJ	(Peered) Forum IBM PC
PCSUPT-L	@ YALEV1	Discussion for MS-DOS PC technical support staff
PCTECH-L	@ TREARN	MS-DOS compatibles support group
PROG-A16	@ UOGUELPH	INFO-ATARI16 Programs
SHOPTALK	@ MCGILL1	Micro Computer Users Forum
SOFTREVU	@ BROWNV1	Small computing systems software review
SYS7-L	@ UAFSYSB	Macintosh System 7.0
WIN3-L	@ UICV1	Microsoft Windows and related issues
WORD-MAC	@ HVRFORD	Microsoft Word for the Macintosh
WORD-PC	@ HVRFORD	Microsoft Word for DOS and Windows

Networking Hardware and Software

3-COM-L	@ NUSV1	3-Com users interest group
I-KERMIT	@ CUVMA	(Peered) INFO-KERMIT Digest
PCIP	@ IRLEARN	TCP/IP protocol implementations for PC
PROCOM-L	@ ATSUVAX1	Users of Procomm terminal emulators
TCP-IP-L	@ UIUCVMD	TCP-IP discussion from SRI-NIC

TABLE 2: INTEREST GROUPS OF POTENTIAL VALUE TO K-12 AUDIENCES

To subscribe to one of these groups, send an e-mail message to a special subscription user-id, which is made by adding "-request" to the discussion group's user-id. For example, to subscribe to:

kidsnet@vms.cis.pitt.edu

send e-mail to

kidsnet-request@vms.cis.pitt.edu

in the body of your message, indicate that you would like to be subscribed to the group.

A wide variety of many other online databases is provided in Chapter 12 of NUSIRG.

Subscription List Name and Address	Specific Subjects Covered
K-12 Networking Generally	
kidsnet@vms.cis.pitt.edu	Global network for kids and teachers
ai-ed@sun.com	Applications of artificial intelligence to education
Technical Issues	
info-cpm@wsmr-simtel20.army.mil	8 and 16 bit CP/M operating system
info-modems@wsmr-simtel20.army.mil	modem discussion
pcip@udel.edu	Discussion on TCP/IP for PCs
Hobby or Recreation Oriented	
bicycles@bbn.com	Bicycle sports and use
brass@dinorah.wustl.edu	Small ensemble brass musicians
cards-request@tanstaaf1.uchicago.edu	Collection and trading of sports cards/memorabilia
horses@bbn.com	Horse enthusiasts
stagecraft%cai@cs.utah.edu	Theatre sets, lighting, etc.
whitewater@iuvax.cs.indiana.edu	Whitewater kayaking, rafting

TABLE 3: POINTERS TO USENET GROUPS AND CATEGORIES OF PARTICULAR INTEREST TO K-12 EDUCATORS

There are thousands of USENET newsgroups. First time users of USENET often become overwhelmed by the diversity and are unable to find what groups are appropriate to their interests.

To help you get started, this list provides a small sampler of a few specific groups and of the hierarchy that might be of particular interest to K-12 educators. Once you've become comfortable with newsreader software and the structure of USENET, there's a huge variety of newsgroups to explore and read.

For information on how to actually use USENET, refer to Chapter 7 of NUSIRG. Note that the first section ("K-12 Lists Distributed From K12Net to USENET") are all accessible directly by accessing K12Net BBS's.

<u>K-12 Lists Distributed From K12Net to USENET</u>

k12.chat.elementary	Informal discussion, elementary students, K-5.
k12.chat.junior	Informal discussion, students in grades 6-8.
k12.chat.senior	Informal discussion, high school students.
k12.chat.teacher	Informal discussion, K-12 teachers.
k12.ed.art	Art curriculum in K-12 education.
k12.ed.business	Business education curriculum in grades K-12.
k12.ed.comp.literacy	Teaching computer literacy in grades K-12.
k12.ed.health-pe	Health and Physical Education in grades K-12.
k12.ed.life-skills	Home Economics & Career education, grades K-12.
k12.ed.math	Mathematics curriculum in K-12 education.
k12.ed.music	Music and Performing Arts curriculum in K-12.
k12.ed.science	Science curriculum in K-12 education.
k12.ed.soc-studies	Social Studies and History curriculum in K-12.
k12.ed.special	Education for students w/ handicaps or special needs.
k12.ed.tag	Education for Talented And Gifted students.
k12.ed.tech	Industrial Arts, vocational education, K-12.
k12.lang.art	Language Arts curriculum in K-12 education.
k12.lang.deutsch-eng	Bilingual German/English with native speakers.
k12.lang.esp-eng	Bilingual Spanish/English with native speakers.
k12.lang.francais	Bilingual French/English with native speakers.
k12.lang.russian	Bilingual Russian/English with native speakers.

A Sampling of Other USENET Newsgroups of Potential Interest to K-12

bionet.general
comp.dcom.modems
misc.consumers
misc.consumers.house
misc.education
misc.kids
misc.rural
misc.writing
news.announce.newusers
news.answers
news.newusers.questions
news.software.readers
sci.edu

Major USENET Newsgroup Hierarchies

bit.listserv.*
comp.*
rec.*
sci.*
soc.culture.*

Each of these "hierarchies" in this list of five contain numerous, very specific newsgroups which you may find interesting. For example, within "sci.*" are groups such as "sci.biology"and "sci.geo.meteorology". (The asterisk is standard computer shorthand for "this space might be occupied by much more text.")

TABLE 4: ELECTRONIC JOURNALS OF POSSIBLE VALUE TO K-12 EDUCATORS

Currents:	The use of computing in education. subscription: jebell%uncamult.bitnet@cunyvm.cuny.edu
Distance Education Online Symposium (DEOS)	Distance education; many articles on K-12 issues. subscriptions: listserv%psuvm.bitnet@cunyvm.cuny.edu message: SUB DEOS your-full-name To cancel a subscription, send mail to the same address, message UNSUB DEOS your-full-name.
Effector Online:	Computer based communication, esp. issues of freedom of speech, privacy, censorship, and policy subscription: eff-request@eff.org
Ejournal:	An electronic journal about electronic journals subscription: listserv%albnyvm1.bitnet@cunyvm.cuny.edu message: SUB EJRNL your-full-name To cancel a subscription, e-mail to the same address, message UNSUB EJRNL your-full-name
F.A.S.T. News:	Articles, bibliographies, job listings, etc. on arts, science and technology. subscription: isast@garnet.berkeley.edu
Handicap Digest:	Issues dealing with the handicapped. subscription: wtm@bunker.shelp.isc-br.com via modem: Handicap News BBS (203) 337-1607 (300, 1200 and 2400 baud) (Fidonet 1:/141/420) Compuserve 73170,1064
History and Analysis of Disabilities Newsletter:	News, and announcements of conferences, seminars, books, articles, theses, research, organizations dealing with the historical study of disabilities. subscription: fcty7310%ryerson.bitnet@cunyvm.cuny.edu
Impact Online:	Social & ethical concerns of information technology subscription: bcs-ss1@compass.com

ADDENDUM 1A: CONTACTS FOR REGIONAL INTERNET SERVICE PROVIDERS

Network Name	Service Locale Contact Name Phone Number E-mail Address
BARRNET	Bay Area, CA William Yundt (415) 723-3104 gd.why@forsythe.stanford.edu
CERFnet	Los Angeles Area, CA CERFnet Hotline (800) 876-2373 help@cerf.net
CICnet	Midwest US John Hankins (313) 998-6102 info@cic.net
CO Supernet	CO Ken Harmon (303) 273-3475 kharmon@csn.org
CONCERT	NC Joe Ragland (919) 248-1404 jrr@concert.net
JVNCNet	Eastern US and International Sergio Heker (609) 258-2400 heker@jvnc.net
Los Nettos	Los Angeles Area Ann Westine (213) 822-1511 los-nettos-request@isi.edu
MichNet/Merit	MI Jeff Ogden (313) 764-9430 jogden@merit.edu
MIDnet	NE Dale Finkelson (402) 472-5032 dmf@westie.unl.edu

MRNet	MN Dennis Fazio (612) 342-0003\ dfazio@ssesco.com
NEARnet	Northeastern US (ME, NH, VT, CT, RI, MA) John Rugo (617) 873-2935 nearnet-staff@nic.near.net
NETillinois	IL George Badger (217) 333-1637 badger@vmd.cso.uiuc.edu
NevadaNet	NV Jim Williams (702) 739-3557 greyfox@nevada.edu
NorthWestNet	Northwestern US (AK, ID, MT, ND, OR, WA, WY) Eric Hood (206) 562-3000 ehood@nwnet.net
NYSERNet	NY Jim Luckett (315) 443-4120 luckett@nysernet.org
OARnet	OH Alison Brown (614) 292-8100 alison@oar.net
PREPnet	PE Thomas Bajzek (412) 268-7870 twb+@andrew.cmu.edu
PSCNET	PE, OH, WV (Supercomputer) Eugene Hastings (412) 268-4960 pscnet-admin@psc.edu
Sesquinet	TX Farrell Gerbode (713) 527-4988 gerbode@rice.edu

SDSCnet	San Diego Area (Supercomputer) Paul Love (619) 534-5043 loveep@sds.sdsc.edu
SURAnet	Southeastern US + Territories Jack Hahn (301) 982-4600 hahn@sura.net
TENET	TX Tracy LaQuey Parker (512) 471-5046 tracy@utexas.edu
VERnet	VA James Jokl (804) 924-0616 jaj@virginia.edu
WESTNET	Western US (AZ, CO, ID, NM, UT, WY) Pat Burns (303) 491-7260 pburns@yuma.acns.colostate.edu
WiscNet	WI Tad Pinkerton (608) 262-8874 tad@cs.wisc.edu
WVNET	WV Harper Grimm (304) 293-5192 cc011041@wvnvm.wvnet.edu

ADDENDUM 1B: CONTACTS FOR COMMERCIAL INTERNET SERVICE PROVIDERS

AlterNet	US and International (703) 876-5050 info@uunet.uu.net
ANS	US and International Joel Maloff (313) 663-7610 maloff@nis.ans.net
PSInet	US and International PSI, Inc. (703) 620-6651 info@psi.net

ADDENDUM 2: STATEWIDE EDUCATION NETWORKS AND CONTACTS

This addendum is used by permission from a report entitled "Statewide Education Networks Survey Results" prepared by Barbara Kurshan and Marcia Harrington. Their contact information appears at the end of this document.

In addition to contacts for particular state networks (indicated by BOLD print names), this list also includes the contact information for many other organizations or individuals who provided information about statewide networks for Kurshan and Harrington's report. These may be useful resources for your inquiries about state networking.

Note that the survey was completed in January, 1991. Consequently some of the contact information may have changed, especially in light of the rate at which state networks are evolving.

NETWORK CONTACT LIST BY STATE

ALABAMA

\---
Ron Wright
Alabama DOE
3317 Gordon Persons Bldg
Montgomery, AL 36130
205/242-8071

SDENET
Rex C. Jones
Alabama DOE
5327 Gordon Persons Bldg
Montgomery, AL 36130
205/242-9590

ALASKA

UACN
Mike Cinij
UAS
11120 Glacier Hway
Juneau, AK 99801
907/789-4570

UACN
Cathy Carney
Alaska DOE
Box F
Juneau, AK 99811-0500
907/465-2841

ARIZONA

Arizona EdLink
John Cikalo
EdLink
1900 W Thomas Ave
Phoenix, AZ 85015
602/255-5061

\---
Kathryn Kilroy
Arizona DOE
1535 W Jefferson
Phoenix, AZ 85007
602/542-5024

CALIFORNIA

\---
Vince Madden
California DOE
721 Capitol Mall
Sacramento, CA 95814

\---
Barbara O'Connor
Educ. Techn. Commiss.
Univ of CA at Sacramento
Sacramento, CA

916/445-0775	916/278-6415
---	CSUNET
Diane Rude	Craig Blurton
Econ. Dev., Trade & Technology	California Techn Project
1100 J Street, Suite 404	PO Box 3842
Sacramento, CA 95814	Seal Beach, CA 90740
916/445-4591	213/985-9631

COLORADO

---	Colorado Learning Network
Karen Sanstead	Eric Feder
Business/Education Partnerships	Colorado DOE
136 State Capitol	207 Colfax Ave
Denver, CO 80203	Denver, CO 80203
303/866-2471	303/866-6859

CONNECTICUT

---	---
Linda Naimi	Sigmund Abeless
Connecticut DOE	Connecticut DOE
165 Capitol Ave	165 Capitol Ave
Hartford, CT O6106	Hartford, CT O6106
203/566-4987	203/566-4825
Knowledge Network	SNET
Betty Goyette	Thomas Buckley
---	SNET
165 Capitol Ave	227 Church
Hartford, CT O6106	New Haven, CT 06506
203/566-6660	---

DELAWARE

University of Delaware	---
William J. Geppert	Thomas F. Brennan
Dept of Public Instr	Dept of Public Instr
Townsend Bldg	Townsend Bldg
Dover, DE 19901	Dover, DE 19903
302/739-4888	302/739-3721

FLORIDA

SUNSTAR & FIRN	---
Bill Schmid	David Brittain
Florida DOE	Florida DOE
B1-14 Florida Educ Center	Knott Bldg
Tallahassee, FL 32399	Tallahassee, FL 32301
904/487-0911	904/488-0980

GEORGIA

GEIS
Les Butler
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Atlanta, GA 30306
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GC EduNET
Frank Lowney
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Milledgeville, GA 31061
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HAWAII

PLATO
Jon Nakasone
Comp Center Keller Hall
University of Hawaii
Honolulu, HI 96822
808/956-2409
\---
James Bannan
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1302 Queen Emma St Rm 204
Honolulu, HI 96813
808/548-6990

Hawaii Intact. TV System
C J Baehr
Hawaii Public TV
2350 Dole St
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IDAHO

Northwest Star Schools
Ken Reed
Idaho DOE
650 W State
Boise, ID 83720
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INDIANA

KnowledgeNet
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317/232/0808

IDEANet
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317/232-0808

IHETS
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Intelenet Commission
17 W Market Street
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Electronic School District
Michael Halla
ESD
1000 E 17th St
Bloomington, IN 47405
812/855-2222

IOWA

UNI

IOWA Communications Network

Bill Callahan
College of Education
University of Northern Iowa
Cedar Falls, IA 50614-0615
319/273-2719

Dean Crocker
Communications Division
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Des Moines, IA 50319
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KANSAS

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Topeka, KS 66612
913/296-1230

KENTUCKY

KET
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1825 Capital Plaza Tower
Frankfort, KY 40601
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MAINE

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207/622-7131

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Augusta, ME O4333
207/289-5815

MENET (MaineNet)
Blynn C. Currier
Maine DOE
University of Maine Augusta
Augusta, ME 04333
207/621-0903

MASSACHUSETTS

MASSNet
Ann Von der Lippe
MASSNet
6 St James Avenue
Boston, MA O2120
617/727-9500 413/545-1955

UMASS Campus Network
Randy Sailer
University of Mass
239 Whitmore Admin Bldg
Amherst, MA O1003

MICHIGAN

Michigan Comm. College Network

Michigan Info. Tech Network

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517/372-4350

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PO Box 30008
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Brian Raymond

4660 S Hagadorn
East Lansing, MI 48823
517/336-1321

Jamey Fitzpatrick
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PO Box 30008
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517/373-1806

MINNESOTA

MNSAT (Satellite & Technology)
Penelope L. Dickhudt
State Board of Voc. & Techn. Ed
130 Capitol Sq Bldg 550 Cedar
St Paul, MN 55101
612/296-2256

Joan Wallin
Minnesota DOE
660 Capitol Sq Bldg 550 Cedar
St Paul, MN 55101
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Robert Price
Control Data Corp
8100 34th Ave S
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Helena, MT 59620
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Dillon, MT 59725
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NEBRASKA

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NEVADA

Frank South
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Technet/Nedcomm
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Albuquerque, NM 87131
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Technology Network Ties (TNT)
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William Halligan
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Elem. & Sec. Educ. Plan
Albany, NY 12234
518/473-9106

New York Network

Greg Benson
New York Network
AE Smith Bldg, 12th Floor
Albany, NY 12225
518/443-5333

NORTH CAROLINA

NCDLS Network
Linda K. DeGrand
NC Dept of Public Instr
116 W Edenton St
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919/733-3193

NCDLS Network
Elsie L. Brumback
NC Dept of Public Instr
116 W Edenton St
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919/733-3170

NORTH DAKOTA

Higher Education Computer Network
(HECN)
Larry Isaak
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State Capitol
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Bismarck, ND 58505-0154
701/224-2960

OHIO

\---
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614/466-3708

\---
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614/466-2329

Ohio Educ. Computer Network
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Ohio Educ. Computer Network
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614/466-7003

Ohio Educational Broadcasting
Blan Fuller
Ohio Educational Broadcasting
2470 North Star Road
Columbus, OH 43221
614/644-1714

OKLAHOMA

Televised Instruction System
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OK State Regents
500 Educ Bldg, State Capitol
Oklahoma City, OK 73105
405/524-9160

OREGON

OR EdNet
Ray Lewis
Oregon ED-NET
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OR EdNet
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Oregon DOE
\---
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RHODE ISLAND

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SERC-SC
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SOUTH DAKOTA

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SD Public Broadcasting
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TEXAS

TEA-NET
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Austin, TX 78701
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UTAH

EDNET & UT Network for Inst TV
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250 East 500 South
Salt Lake City, UT 84060
801/538-7947

Helen Lacy
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University of Utah
Salt Lake City, UT 84112
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VERMONT

Vermont Interactive TV
Judith Hastings
VT Techn College
PO Box 500
Montpelier, VT O5061
802/728-3391

Vermont Ed-Net
Alan Kousen
Vermont DOE
120 State Street
Montpelier, VT 05620
802/828-3111

VIRGINIA

VA.PEN
Glen Bull
Curry School of Education
405 Emmett Street
Charlottesville, VA 22901-2495
804/924-7471

VA.PEN
Cameron Harris
VA DOE
Info. Serv., P.O. Box 6Q
Richmond, VA 23216-2060
804/225-2757(2099)

WASHINGTON

STEP/Star Schools
Cheryl Lemke
OSPI
Old Capitol Bldg., FG-11
Olympia, WA 98504
206/586-2053

WEST VIRGINIA

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Charleston, WV 25305
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SATNET
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SATNET
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304/766-2070

WISCONSIN

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STS/CDN
Jody McCann
Info. & Telecomm. Mgt
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608/266-6700

CANADA

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Alberta Educ Response Center
6240 113th Street
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We'd like to thank the following two people for allowing us to include the contact information, which they compiled, in this addendum.

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	kurshan@vtvm1	(BITNET)
	B.KURSHAN	(Applelink)
	71420,3512	(CompuServe)
phone:	(703) 774-0193	

Marcia Harrington

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e-mail:	marciah%vtvm1.bitnet@cunyvm.cuny.edu	(Internet)
	marciah@vtvm1	(BITNET)

ADDENDUM 3: COOPERATIVE NOT-FOR-PROFIT NETWORK PROVIDERS

FrEdMail Foundation

FrEdMail Foundation
P.O. Box 243
Bonita, CA
91908-0243

contact: Al Rogers
e-mail: arogers@fred.org (Internet)
phone: (619) 475-4852

K12Net Council (board of directors)

Gordon Benedict
Calgary, Alberta, Canada
Voice phone: 403/228-0975; 229-9731
Sysop of 1:134/49 (403/228-9525 HST 403/229-0477 2400)
UCAEDU.BITNET!BENEDICT
K12Net Zone 1 Backbone

Jack Crawford, W-FL Teacher Resource Center
3501-K County Rd. 20,
Stanley, NY 14561 USA.
Voice phone: 716/526-6431
Sysop of 1:260/620 (716/526-6495)
Internet: jack@k12net.org
K12Net Zone 1 Backbone

Janet Murray, Wilson High School
1151 S.W. Vermont St.
Portland, OR, 97219 USA.
Voice phone: 503/280-5280
Sysop of: 1:105/23 (503/245-4961)
Internet: jmurray@psg.com
K12Net Zone 1 Backbone

Rob Reilly, Lanesboro School
188 Summer St.
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Voice phone: 413/443-0027
Sysop of 1:321/218 (413/443-6725)
Internet: rob@k12net.org
K12Net Files Library

Gleason Sackmann
Box 5164
NDSU Computer Center

Fargo, ND 58105 USA
Voice phone: 701/237-8109
Fax: 701/237-8541
Internet: sackman@plains.nodak.edu
Sysop of 1:288/5 (701/228-2908)
K12Net Echo Moderator Coordinator

Mort Sternheim, Dept. of Physics and Astronomy
University of Massachusetts
Amherst, MA 01003 USA
Voice phone: 413/545-1908 (W)
413/253-2252 (H)
Sysop of 1:321/109 (413/256-1037)
K12Net Zone 1 Backbone

Andy Vanduyne
Norwood Elementary School
Norwood, NY 13668 USA
Voice phone: 315/353-6674
Sysop of 1:260/375 (315/353-4565)
K12Net Channel Coordinator

National Public Telecommunications Network

T.M. Grundner, Ed.D
President, NPTN
Box 1987
Cleveland, Ohio 44106

Voice:	(216) 368-2733
Internet:	aa001@cleveland.freenet.edu
BITNET:	aa001%cleveland.freenet.edu@cunyvm.cuny.edu
CompuServe:	72135,1536

SECTION 6: EMPOWERING SCIENTIFIC RESEARCH

Chapter 16: Using Supercomputers on the Internet

USING SUPERCOMPUTERS

One of the primary purposes of many parts of the American portion of the Internet (particularly NSFNET) is to provide researchers easy access to supercomputing resources at a number of centralized supercomputer sites. This chapter provides an introduction to the basic principles of supercomputer use and includes detailed site descriptions for a number of the NSF-sponsored supercomputer facilities accessible through the Internet.

SUPERCOMPUTERS: GROWTH AND FUTURE

One of the most amazing phenomena of recent times has been the growth of the computer industry from a laboratory curiosity at the end of World War II to a major player in the economies of the world today, followed by rapid penetration into nearly all areas of life. The growth has been accomplished through extraordinary reductions in size and cost, and improvements in speed, reliability, and usability.

Not long ago a new class of computers has emerged: supercomputers. By one definition supercomputers are "At any given time, that class of general-purpose computers that are both faster than their commercial competitors and have sufficient central memory to store the problem sets for which they are designed" [1]. By this definition, it might appear that supercomputers have been with us from the start, and differ only quantitatively from other computers. In fact, supercomputers are qualitatively different in that they employ different architectures which result in major differences in programming and use.

According to the report "A National Computing Initiative" [2] the American research community will require a thousand-fold increase in computational power over the next few years. This growth is propelled by factors which are likely to exist for a long time to come.

One reason is the dramatic change in international economic competition. Since World War II many countries, especially in Eastern Asia, have entered into the economic mainstream armed with a powerful combination of Western technology and indigenous cultural backgrounds. These countries are redefining many economic and industrial roles and are putting severe pressure on the American economy. Technological innovation, especially in leading-edge fields such as computers, is viewed as a major way to help our competitive stature.

Another reason is that computers are assuming new roles. Computation is now recognized as the third mode of science, co- equal with theory and laboratory research [2]. Simulation of complex real world phenomena is increasingly possible and indeed necessary for future advance: investigations of very large (galaxies), very small (electron orbits), very fast, very slow, very complex, dangerous, or highly energetic phenomena are often possible only through simulation. Computers can also provide "impossible views" of objects under conditions which can never be obtained physically.

Finally, human activities are causing changes in the natural world: developments such as pollution, the destruction of rain forests, ozone depletion, and the greenhouse effect, require extensive monitoring and modelling which would be impossible without the computational and data management capabilities of supercomputers.

SUPERCOMPUTERS--ALWAYS A NEED

The enormous progress in computer hardware will result in a "desk-top-CRAY" in the near future. With such powerful personal computers will we still need supercomputers? The answer appears to be yes. However powerful PC's become, there will always be problems which strain the leading edge of whatever computational powers we develop. The objects of study of disciplines such as mathematics (especially combinatorial problems), and the physical, biological and social sciences are infinitely complex, and computer simulations can never exhaust analytical possibilities. Many simulations today scrape by with the coarsest possible resolution in the hope that important details are not neglected. Increased resolution can come only at great computational cost: for example, a ten-fold increase in spatial resolution in each of 3 dimensions translates into a thousand-fold increase in computational operations. Naturally, many-dimensional problems would require much greater increases. The combined requirements of computational power, data storage, and data flow should insure the continued need for supercomputer sites.

SUPERCOMPUTER SITES

By their very nature, supercomputers are expensive and require extensive hardware, software, documentation, and personnel support in order to function. Vast computational performance must be matched by massive data storage capacities, large data flows, high resolution output devices, an extensive communications interface, as well as a wealth of software applications, libraries, documentation, and expert consulting.

A number of supercomputer sites are currently promoted as national research centers. They are focal points for the collection and distribution of software, documentation, and extensive sets of examples; for training programs, seminars, and symposiums for high-performance graphics laboratories for visualization; and communication facilities in the form of e-mail, lists, and bulletin boards for specialized user groups.

The wealth of different services available at supercomputer sites implies that you should shop carefully in order to locate a site which best matches your needs. The types of software (editors, languages, packages, and operating systems), hardware (memory size and structure, vector and parallel hardware), and services (graphic output, type of consulting) affect the appropriateness of a site to your intended uses. For example, some systems couple high performance vectorization with somewhat limited memories, others feature very large memories with limited vectorization capabilities, whereas others specialize in massively parallel systems.

THE NSF BACKBONE

Supercomputers were born in the U.S. but were generally unavailable to university scientists because of their high costs. Some American scientists actually went to Europe to obtain time on U.S.-built supercomputers. Recognizing the importance of computing access, the NSF established five supercomputer centers across the nation in 1984. Time on these machines is obtained mainly through several grant mechanisms and is otherwise free of charge.

The NSF also helped establish a communications network, called the NSF backbone, which connects these centers and links them to regional networks.

Originally, the centers were deliberately designed to differ from one another in order to make make more options available to researchers, and to test out a variety of novel machine architectures, operating systems, and support strategies under real-life conditions. Recently, however, the systems have converged around several models of CRAY computers, IBM 3090s, and the new massively parallel Connection Machines, mostly running slight variants of Unix.

SUPERCOMPUTER HARDWARE

Supercomputers are not just big, fast machines that use state-of the-art hardware; they also feature special architectures. While these architectures can greatly boost performance, their full power can only be exploited under certain conditions and often require that the program and/or problem itself be restructured by someone who understands how these architectures function.

The most common supercomputer architectures include special memory organization, such as cache memories in the IBM 3090, or independent memory banks in the CRAYs, vector hardware (also called pipeline hardware) present in nearly all supercomputers, and parallel hardware, usually in the form of multiple processors. All of these features have recently started to appear on non-supercomputers, but their implementation and support are especially well developed on supercomputers.

Cache Memories

For a given price, memory can either be big and slow or small and fast. A cache is a small and very fast memory which serves as a buffer to a large slow memory; therefore, cache memories can, under certain conditions, improve overall performance by reducing the time to access main memory. When an operand is fetched from main memory, both it and a number of its nearest neighbors are placed in the high speed cache. If the next reference is to a neighbor, it will be taken from the cache instead of the main memory. If memory usage in the program tends to be highly clustered, then the program operates mainly out of the cache and performance increases greatly. On the other hand, if memory usage is highly scattered, then the cache memory can actually degrade performance.

Independent Memory Banks

Independent memory banks are another way of speeding memory access and storage. A reference to a given bank of memory cells ties up the bank for a number of machine cycles, and no further access is possible until the bank is free. Some computers arrange memory into a number (64 on the CRAY) of independent banks so that most memory references address different banks and do not interfere with one another.

Typically the banks are arranged so that adjacent words, such as X(1), X(2), X(3), reside in different banks. For example, the loop

```
DO 10 I=1,N
```

runs faster with an independent memory bank architecture since the storage times for X(1), X(2), X(3), X(4) etc., are overlapped. However, array structures or patterns of array access which are discordant with the memory architecture can defeat the architecture and slow execution considerably. For example, on a 64 bank memory the following code:

```
    DIMENSION X(64,50)
```

```
      DO 10 J = 1,50
10    X(1,J) = 0.0
```

would nail the same bank each and every time through the "J" loop, since X(1,1), X(1,2), X(1,3) etc. reside in the same bank. In this case the problem can easily be solved by redimensioning X as X(65,50) in order to change the memory layout.

Vector Hardware

Vector hardware is currently the most widespread and mature of the special architectures found in supercomputers. Vector units consist of CPU components such as add or multiply units which are divided into a number of sequential stages or segments. The units typically accept two vectors of numbers which proceed through the segments and emerge out the other end as a vector of results. As long as the vectors continue to flow, the process is efficient, and speedups by a factor of 5 or 10 are not uncommon, but starting and stopping the units for short vectors can actually increase execution time. Efficient vector operation often requires some restructuring of code by the programmer as well as the use of compiler directives to monitor and control the process. A more complete description of vector operations appears later in this document.

Parallel Hardware

Parallel architecture distributes the processing of a single program over a number of different physical processing units. It offers the greatest potential for vast increases in performance of any known architectural layout. For example, a machine with 10,000 processors might solve some problems almost 10,000 times more quickly than a single processor machine. However, most programs cannot be partitioned so completely into independent units, and many difficult hardware and software issues remain unsolved and are the subject of intense research. At present, limited parallelism can be exploited on the IBM 3090 and CRAYs, and massive parallelism is possible with the Connection Machine. The effort needed to restructure code ranges from about the same as for vectorization to considerably more. A more complete description of parallel operations appears later in this document.

Impact on Debugging and Graphics

Supercomputers are so powerful and generate such vast amounts of information that they force major changes in both debugging techniques and in the presentation of output. Ad hoc debugging techniques are woefully inadequate for dealing with, say, an error in the 471,000-th iteration of a 500 variable program operating on 18 million separate values. Special debugging software is required which lets you examine values, restart code at various points, observe the effects of changes in values, run controlled experiments, etc.

Similarly, traditional printed and even standard graphical output is often inadequate to represent the millions or even billions of separate data values that can be provided by a supercomputer run. The term "visualization" is the latest buzzword used to describe the sets of advanced graphical techniques which address this problem. Visualization often involves high resolution displays, extensive use of color, 3D representations, and extensive interactive control of the image in order to control the viewing angle, collapse dimensions in a multi-dimensional data set, or perform image processing functions in order to extract or highlight desired information. Existing graphics packages are often insufficient for the task as they emphasize the display of 2- and 3-dimensional XY, XYZ, or contour plots, whereas the representations of complex simulated phenomena require some combination of image processing approaches along with more standard graphic techniques. In addition, graphics place severe demands on data transmission as well as real time interaction.

Other Hardware Issues

Other hardware issues include memory size and use of high speed peripherals, such as the Solid State Disk (SSD), available on some CRAYs.

The hardware available at different supercomputer sites should be a major consideration in your selection. For example, a CRAY Y-MP is extremely good for highly optimized vector operations, but is somewhat limited in terms of memory, an IBM 3090 has an immense memory but only modest vector performance, and a Connection Machine is much superior for highly parallel problems.

SUPERCOMPUTER SOFTWARE

Supercomputer sites are often endowed with a rich collection of applications software in the areas of Chemistry, Physics, Engineering, Mathematics, and Graphics. Computer languages, however, are confined mainly to FORTRAN, Pascal, and C, and FORTRAN is the only language that is extensively optimized for vector/parallel operations at all sites.

Operating Systems

While the early sites featured a variety of operating systems, most have converted to variants of Unix (UNICOS on the Crays, AIX of the IBM 3090, and Ultrix on some front ends), and CMS which shares the 3090 with AIX. A few sites also offer VMS font ends.

Workstation Support

Some sites provide extensive support for Workstation and PC software to be used in conjunction with the supercomputer or its front end. NCSA at Illinois, for example, provides free downloadable graphics and communications software for PCs, SUNs, and Macintoshes.

Software is probably the single most important consideration in site selection. Unfamiliar languages or editors can greatly increase learning time; programs, data files, and data formats may have to be restructured to move to a particular environment, and future portability must be kept in mind; non-FORTRAN programs may have to be rewritten or run in a non- or sub- optimized mode; and major applications programs, libraries, or graphics libraries may be unavailable or at different revision levels.

SUPERCOMPUTER PERFORMANCE GAINS

Despite the many "fringe" benefits of supercomputer sites, such as access to software, training, graphics, and collaborative research, the main purpose in using supercomputers is to exploit their size and speed in order to handle otherwise intractable problems. The performance of supercomputers is due mainly to two factors:

- ❑ Supercomputers are generally big, fast machines which employ high performance technology. As a result, all computer programs automatically benefit.
- ❑ Hardware architectures, such as cache memory, independent banks, instruction stacks, high speed I/O, vector, and parallel operations which, although not unique to supercomputers, are usually more highly developed. The exploitation of these features is partly automatic but can also benefit significantly from modifications by the programmer.

Vector and parallel architectures are most often emphasized in optimization, but attention to the other architectures mentioned above can bring about major performance gains as well. One should also note that (a) extensive optimization should only be done in conjunction with special timing tools which locate those portions of the program which can benefit most, and (b) optimization should only be carried to a certain degree--smarter compilers in the near future will be able to optimize well structured code much better than the "spaghetti" code that often results from overzealous hand optimization.

PERFORMANCE GAINS THROUGH SPECIALIZED HARDWARE

The most significant performance gains are obtainable through vector processing and parallel processing hardware.

Vector Processing

Vector processing can best be explained through analogy. Imagine a factory which assembles 6-bladed airplane propellers. It has 6 people, p1,p2,...,p6, at 6 workstations who attach each blade in turn to the hub. Person p1 receives a tray with the parts and assembles the first blade to the hub. When done, he passes the tray along with his partial assembly to p2. P2 attaches the 2nd blade and when done passes the tray and his partial assembly to p3, and so on.

Of course, when p1 has passed his partial assembly to p2 he does not just quit for the day. Instead he immediately gets a new tray and starts a new assembly. Similarly, p2 no sooner finishes his assembly when he gets the tray and the partial assembly from p1 and begins attaching the second blade.

After 6 time periods, the above pipeline is filled with 6 different stages of assembly. The important point to note is that while it still takes 6 time periods to assemble any given propeller, a new finished propeller emerges from the assembly pipeline each and every time period. We have speeded up the assembly process by a factor of 6 by using 6 people in a quasi-parallel manner. Note that even if a product required 10,000 stages to assemble, the products would still emerge at the rate of 1 per time period. In other words, production speed is independent of the complexity or length of the assembly process. On the other hand, if the pipeline is interrupted for any reason, a very long pipeline (or assembly process) will take much longer to restart than a short one.

In supercomputers, the vector or pipeline process is usually applied to arithmetic units, such as add, multiply, or divide units which "assemble" new numbers from the vectors of input numbers.

For example, a multiply unit on the CRAY contains 7 stages. The FORTRAN code

```
      DO 10 I = 1,60
10    C(I) = A(I)*B(I)
```

is converted to vector instructions which start loading the vectors A(1), A(2),... and B(1), B(2),... into special vector registers. As soon as the first pair is available, A(1) and B(1) enter the multiply unit to begin the first stage of multiplication.

At the end of one clock cycle, the partial multiplication of A(1)*B(1) moves to the 2nd stage in the multiply unit, and A(2), B(2) enter stage 1; at the end of the 2nd cycle, A(1)*B(1) moves to stage 3, A(2)*B(2) moves to stage 2, and A(3), B(3) enter stage 1. This process continues and at cycle 7 all seven stages are being utilized, the fully multiplied value of A(1)*B(1) emerges and is stored in C(1), and A(8), B(8) get ready to enter stage 1. From then on, a new multiply is finished every clock cycle, even though it takes 7 cycles to complete one multiply. We have increased the speed almost by a factor of 7 (except for initiating the pipeline).

Vectorization only applies to explicit DO-loops in FORTRAN and their equivalents in other languages. Only one loop within a nest of loops can be vectorized, but the software automatically selects the loop unless that choice is overridden by directives from the programmer.

There exist many obstacles to vectorization, some of which are easily overcome (for example, changing the order of statements), some which require use of compiler directives to modify the vectorization process, and some which require major restructuring of the code. On high performance vector machines, such as the CRAY, speedups of a factor of 5 or 10 for that portion of the code that can be vectorized are not uncommon.

Parallel Processing

The basic idea of parallel processing is easier to grasp than vector processing, but the usage, implementation, and many of the concepts are more difficult. On the other hand, the rewards may be much greater since the potential speedup is proportional to the number of processors available, whereas vector speedup can never be much more than a factor of 10.

Parallel systems distribute the work of a program or subroutine among a number of processors. In some implementations, such as CRAY Macrotasking, the number and operation of parallel processors must be predetermined; in other implementations, such as CRAY Microtasking, the number, identity, or order of execution of the processors is unknown and variable (this has many consequences which influence the structure of a parallel program and hence the modifications needed to convert an existing program to parallel operation). Most of the following discussion applies to CRAY Microtasking.

Some of the concepts of parallel processing are illustrated by the execution profile of subroutine ABC:

```
SUBROUTINE ABC

   (Block B1)        a block of code executed by one processor
   (Block B2)        another block executed by a processor
   (Block B3)        another block executed by a processor

RETURN
END
```

The subroutine is entered at the top under the control of a single processor, after which control is transferred to one, two, or three other processors for blocks B1, B2, and B3. When all of the blocks are finished, control is returned to a single processor which terminates the subroutine. The execution profile might look like this:

Time	Processor 1	Processor 6	Processor 4
1	Start ABC	x	x
2	Run B2	Run B1	Run B3
3	x	x	Exit ABC

where "x" means the processor is idle or engaged with another program. The profile is generally unpredictable and the actual number and identity of processors depends on many factors. Because of this unpredictability, the parallel operation is often referred to as a "fray."

A DO-loop is a special case of the above structure:

```
      SUBROUTINE ABC

      DO 10 I = 1,3 (the i-th iteration of the loop is block B(i)

   10 CONTINUE

      RETURN
      END
```

in which some iterations of the loop may be handled by different processors.

Some obvious and not-so-obvious consequences derive from such an implementation. The different code blocks must be totally independent of the sequence in which they are processed: Block 3, for example, cannot depend on the results of, say, Block 1. It is less obvious that local variables assigned values inside a block can have no validity outside the block, that values associated with loop iterations must be explicitly tied to the loop index, and that global variables which are not indexed by a loop index must be "guarded" from simultaneous access. Consider the following section of code:

```
      K = 0
      DO 10 I = 1, 1000
      K = K + 1

   10 CONTINUE
```

The operation of the above loop depends on whether K is local or global. Local variables in a parallel block of code are replicated for each processor that joins in the "fray" whereas global variables occupy a single location which is accessed by all processors.

Suppose that K is a local variable and the 1000 iterations of the loop are randomly distributed among, say, 64 processors. Then processor 17 might handle 23 iterations of the loop, processor 39 might handle 11 iterations, and so on. At the end of the loop, if control is assigned solely to processor 17 then K=23, if assigned to processor 39 then K=11, whereas in a non-parallel environment K always equals 1000.

Inside the loop, if K is used as a substitute for the loop index, then its value depends only on how many times that processor has handled the loop, and so will generally have little relation to the value of the loop index itself. Thus A(K) rarely is the same as A(I), whereas in a non-parallel environment it is always so.

If K is a global variable then it must be guarded from simultaneous access by more than 1 processor. For example, suppose that K=0 and processors 13 and 19 begin execution of RK=K+1S at slightly different times. If 19 accesses the expression before 13 has finished, then K will be reset to 1 instead of being set to 2 as it should be.

This type of code is called a "critical section" and must be guarded by explicit directives which guarantee that another processor can only enter that section of code when the current processor has finished.

Parallel and vector processing are quite compatible and can be used not only in the same program but often in the same nest of loops. For example, some compilers analyze a DO-loop nest and select one loop for vectorization and another for parallel processing. On the CRAY, a single loop can be partitioned into vectorized and parallelized sections.

INTERACTION WITH OPTIMIZING COMPILERS

The goal of an optimizing compiler is to speed the execution of a program without changing the results. It scans the user's source code and identifies structures which can utilize the special hardware found in supercomputers. Since the conditions under which these structures can be safely optimized are very limited, it must analyze much of the surrounding code to determine if, and to what degree, the code can be optimized.

The compiler is subject to several important constraints which limit its effectiveness. Since the optimization is done at compile time it can have no knowledge of the run-time structure of the job. Thus, input data values which may change the flow of execution and the degree of optimization cannot be considered, so the compiler has to assume the worst case and do the least amount of optimization. Another constraint is that optimization is often limited to the scope of a single routine, and interactions between routines which might affect optimization cannot be taken into account. In addition, the technology of optimizing compilers is continually advancing, and any given compiler may be unable to optimize code which later versions can handle.

Because of these limitations it is often necessary for the programmer to supply auxiliary information which eliminates ambiguity and resolves problems which the compiler cannot handle. This is especially important in parallel processing, but is also often required in vectorization. The programmer supplies global directives on the compile statement or embeds local directives in the source code, or both, which guide the optimization process. For example, the following loop would be rejected by any vectorizing FORTRAN because of a "recurrence" relation in the loop:

```
    K = IVAL
    DO 10 I = 1,N
10  A(I) = A(I-K) + 1.0
```

While "recurrence" and other inhibitors of vectorization are beyond the scope of this report (see [4] and [5] for more information), the above code can be vectorized on a CRAY provided that (a) K is negative, or (b) K is greater than 64. If the programmer knows this he can insert compiler directives which force the compiler to vectorize. Thus the code

```
CDIR$ IVDEP                    ("ignore vector dependency")
    DO 10 I = 1,N
10  A(I) = A(I-K) + 1.0
```

in effect, tells the compiler that "I know more than you, so forget your inhibitions and vectorize anyway."

Parallel optimization usually requires more embedded directives than vectorization. It is frequently necessary to explicitly prevent multiple processors from accessing code until all processors have finished operating on a previous section. For example, the CRAY compiler directives (see [6])

```
CMIC$ DO GLOBAL
      DO 10 J = 1,N
                                  (operation on the J-th column of A)
10    CONTINUE
CMIC$  DO GLOBAL
DO 20 I = 1,M
                                  (operation on the I-th row of A)
20    CONTINUE
```

would distribute the operations of the N columns of A and the M rows of A to different processors, but would assure that all columns were finished before any rows were processed. The directives are signaled by "CMIC$" (for Microtasking) in columns 1-5 and apply to the next DO-loop. Thus the start of the second "CMIC$" terminates the first "CMIC$" and tells the compiler that the two loops are to be processed in sequence.

MIGRATING PROGRAM TO SUPERCOMPUTERS

The main point in using supercomputers is to achieve dramatic increases in processing speeds. The increases are partially due to the fact that supercomputers are simply big and fast computers, but much of the increase comes from the special architectures that supercomputers employ. Achieving a high degree of optimization on supercomputers requires a well thought-out strategy as well as realistic expectations as to what can actually be achieved.

The maximum gains that can be obtained through parallel processing or vectorization are controlled by "Amdahl's" law [1]: $P = 1/(1-X+X/a)$ where P is the performance gain, X is that ratio of the code which can be optimized (vectorized or processed in parallel), and "a" is the speedup ratio for vector or parallel code. The important part of the law is that the performance is much more controlled by X, the proportion of the code that can be optimized, than by "a." For example, suppose that $X = 0.80$, so that 80% of the code can be vectorized or processed in parallel. Then the absolute maximum speedup possible is a factor of 5, even if vector or parallel operations are infinitely fast (that is, even if "a" is infinity, then $P = 1/(1-0.8 + 0.8/\text{infinity}) = 1/(0.2) = 5$).

Note that it is rare for X to exceed 0.8 (factor of 5 speedup) for vector processing applications, whereas X may often exceed 0.99 (factor of 100 speedup) for parallel processing applications.

The first step in migrating code to a supercomputer (after making any adjustments to insure that the FORTRAN code will actually compile and run), is to instrument the program in order to identify "hotspots," that is, code which is extremely CPU intensive. A good candidate program for optimization should have an execution profile such that nearly all of the CPU time is spent in just a few percent of the code (if the execution profile is fairly uniform, then hand optimization may be a waste of time). Most supercomputer sites provide easily used compiler directives or other tools which will show you a histogram of CPU time spent versus source code.

If the program has identifiable hotspots, the next step is to read and understand the compiler messages which identify obstacles to optimization. For example, the IBM 3090 compiler provides an in depth analysis of each loop, which identifies not only the obstacles to vectorization, but also the results of an "economic" analysis to determine which loop in a nest of loops yields the best results.

At this point you should analyze the loops highlighted by the compiler to see if any can be replaced by routines from existing optimized libraries, such as the ESSL routines on the IBM 3090. Many such routines are coded in assembly language and are optimized to a very high degree. After this, you should attempt to remove inhibitors to optimization by making local modifications to loops. In many cases this can be done simply by reordering statements, splitting loops, or adding compiler directives. For example, the loops on the left will not vectorize, while the loops on the right (which produce exactly the same results) will:

```
              DO 10 I=2,N                          DO 10 I=2,N
              B(I) = A(I-1)                        A(I)=C(I)
   10         A(I) = C(I)                10        B(I) = A(I-1)

              DO 10 I=1,N                          DO 10 J=1,N
              DO 10 J=1,N                          DO 10 I=1,N
   10         A(I,J)=A(I,J-1)*B(I,J)     10        A(I,J)=A(I,J-1)*B(I,J)
```

In the above examples, a "recurrence" relation existed which prevented vectorization. In the following example, the recurrence relation could not be avoided for one expression, but by splitting the loop into two parts, one of the two expressions on the right can be vectorized:

```
              DO 10 I=1,60                         DO 10 I=1,60
              A(I)=B(I)*C(I)             10        A(I)=B(I)*C(I)
   10         D(I)=D(I-1)*E(I)           20        D(I)=D(I-1)*E(I)
```

When these steps have been taken, further optimization can be achieved by paying careful attention to memory layout or by restructuring the program to obtain the best match between program structure and the architecture of the machine. The latter is, of course, a very time consuming operation and should only be undertaken when the benefits and the costs are fully considered.

ADMINISTRATIVE ACCESS

Resources on all of the NSF sites and some of the other sites are mainly allocated on the basis of grants, rather than by money. Three main grant types are commonly available:

- Large allocations which are subject to formal peer review boards which meet at scheduled times during the year. These boards are comprised of personnel which may be from the site, jointly from several sites, or from NSF.
- Small allocations for startup or familiarization purposes. These are usually available at any time throughout a year.
- Block grants awarded to Universities. The Universities allocate sub blocks of time through their own review boards.

SUPERCOMPUTER GLOSSARY

The following glossary defines some of the terms used in this report. A much more complete glossary of supercomputer terms appears in reference [1].

CGM:	an acronym for Computer Graphics Metafile. It is a GKS standard metafile which contains generalized plot instructions which can then be converted to drive a specific graphics device.
ETHERNET:	a network scheme which uses the Carrier Sense, Multiple Access, and Collision Detect (CSMACD) method of attaching hosts to it. The Ethernet can be used with a number of protocols including TCP/IP and DECNET.
FILE SERVER:	a computer system that permits network users to create or access files.
FTP:	an acronym for File Transfer Protocol. This is a commonly used program that reliably transfers files between two computers on a network.
GBYTES:	a billion bytes of information.
GKS:	an acronym for Graphics Kernel System. An internationally recognized standard for creating graphic images on a computer.
HPGL:	a plot format specifically designed for certain models of Hewlett-Packard plotters.
MAC:	short for Macintosh computer.
MBYTES:	a million bytes of information.
MASS:	a mass storage facility commonly used at supercomputer sites to store large amounts of semipermanent data for each user.
METAFILE:	a generic graphics file which is not designed to drive any existing graphics device but which can be converted to any specific graphics device.
MEMORY BANK:	a region of memory in a computer which has a single access path to it. Any access to a bank blocks all other accesses until it is complete.
MFLOPS:	millions of floating point operations per second.
MWORDS:	millions of computer words.
NS:	a nano-second, or one billion-th of a second.
POSTSCRIPT:	a text and graphics language designed especially for "Desk Top Publishing" environments.
SSD:	an acronym for Solid State Disk, a very large high speed semiconductor memory that serves in place of a rotating disk, but is much faster.
TELNET:	a program that permits a user at one computer to login to another computer.
T1:	a telecommunications medium that allows data to be transmitted at a speed of 1.544 megabytes per second. The NSF backbone and much of NorthWestNet operate at T1 speeds.
VISUALIZATION:	a collection of techniques which make it possible to display the results of calculations. It includes, but it not confined to, standard graphical displays such as line or contour plots. It is especially useful to compress the vast amount of information generated by supercomputers into a comprehensible form.

SUPERCOMPUTER REFERENCES

[1] "Supercomputing: An Informal Glossary of Terms," IEEE Washington Office, 1111 Nineteenth Street, NW, Washington D.C. 20036. 1987.

[2] H.J. Raveche, Duncan H. Lawrie, Alvain Despain, "A National Computing Initiative-An Agenda for Leadership." Society of Industrial and Applied Mathematics, 1400 Architects Building, 117 So. 17th Street, Philadelphia, PA, 19103-5052. 1987.

[3] Norris P. Smith, "Of Supers and Minisupers," Computer Graphics World, August 1988.

[4] Helen M. Doerr, Francesca Verdier, "Improving Vector Performance," and "Introduction to Vectorization," Cornell National Supercomputer Facility, Cornell University, Ithaca, New York, September 1987.

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Chapter 17: Supercomputer Site Descriptions

The following section provides detailed information about six NSF-sponsored sites which provide supercomputer services for NSF sponsored researchers. The purpose of these site descriptions is to allow you to do some preliminary comparisons of each site's hardware, software, and training programs so you can select the supercomputer site which would be most appropriate for your particular research needs.

All of the site descriptions were reviewed or contributed by representatives of each site's user services staff in September, 1991. We'd like to thank the following individuals for their participation:

Supercomputer Site	Reviewed By
Cornell National Supercomputer Facility	Blaise Barney
National Energy Research Supercomputer Center	Jean Schuler
Pittsburgh Supercomputer Center	Deb Nigra
National Center for Atmospheric Research	Juliana Rew
National Center for Supercomputer Applications	Lyle Rigdon
National Center for Supercomputer Applications	Melissa Johnson
San Diego Supercomputer Center	Mark Sheddon

CORNELL NATIONAL SUPERCOMPUTER FACILITY (CNSF)

Computer Hardware

- Two IBM ES/3090 600J, with 6 vector facilities each
- 512 Mbytes main memory each
- 827.6 Mflops maximum speed
- 266 Gbytes of disk storage
- 896 MBytes of memory available to each user application
- Both vector and parallel processing hardware
- 2 Sun workstations
- Stellar Graphics Supercomputer
- Graphics hubs across Cornell campus

Software

- AIX operating system for both 3090s (CMS still available as well)
- Software support for vectorization, including vectorizing compiler and vector libraries
- Interactive and batch modes
- Editor: IBM Xedit
- Text Processors: SCRIPT/VS (includes MFF), TeX
- FORTRAN: VS FORTRAN, PTOOL FORTRAN aids
- Other languages: Assembler, C, EXEC, EXEC2, LISP, PASCAL, PL/I, PROLOG, REXX, APL2 (vectorized)
- PUBLIC: public domain user contributed and supported software

<u>Chemistry</u>

ALCHEMY II
AMBER
AMPAC
CHARMm
DISCOVER 2.5.1
GAMESS
GAUSSIAN 88
HONDO 7PF & 8
KGNMOL
MELDF
MOPAC
VENUS

<u>Computational Fluid Dynamics</u>

FIDAP

<u>Electronics</u>

HSPICE 8907

<u>Engineering</u>

ABAQUS
ESSL
DYNA3D
HSPICE
SUPREM III
VSPICE

FORTRAN Utilities & Debuggers

- FORTRAN IAD
- ROAFP
- FORTAUX
- UTILITY

Graphics

- CONPLOT
- DI-3000
- DISSPLA 11.0
- GDDM
- GDQF
- graPHIGS 2.1
- GRAPHIT
- NCAR
- SAS/GRAPH
- TELL-A-GRAF
- VIEW

Mathematics and Numerical Libraries

- ACMALG
- ACRITH 1.3
- BSPLINE
- CERNLIB
- EISPACK 3
- ELLPACK
- ESSL 3 & 4
- FFTPACK
- FISHPACK
- FUNPACK 2
- GAMS/MINOS
- IMSL 11
- LAPACK
- LINPACK
- LLSQ
- MAPLE 4.0
- MATHADVANTAGE
- NAG 13
- ODEPACK
- QUADPACK
- RECIPES
- REDUCE 3.3
- SCRATCHPAD II
- SLATEC 3.2
- TOEPLITZ

Mechanics

- ABAQUS 4.8.4
- ANSYS 4.4

Programming Languages

- APL2
- ASSEMBLE
- C/370 1.1
- EXEC
- EXEC2
- FORTRAN VS 2.3
- FORTRAN VS 2.4
- HASM
- LISP VM
- PARALLEL FORTRAN
- PASCAL VS 1.2
- PL/I OPT. 2.3
- REXX

Simulation

- GPSS/H 1.99
- SIMSCRIPT II.5
- SLAM II 4.03

Statistics

- BMDP88
- EDA
- GLIM 3.77
- NTSYS 4.6
- SAS 5.18
- SAS/IML
- TSP

Utilities

- PASSTHRU
- PDF
- PIPELINES
- PS INTERPRETER
- PTOOL
- SyncSort
- TOOLS
- VM BATCH

Training

- Introduction to systems, access, languages, and optimization tools for new users
- Summer institutes for researchers working on code
- Undergraduate/Faculty workshops
- Workshops on parallel processing and vectorization
- Computational Chemistry workshops
- Visualization and remote graphics workshops

Collaborative Research

- User groups and Research Interest Groups (Computational Chemistry and Statistics)
- Interdisciplinary research groups open to all researchers
- Corporate Research Institute

Documentation

- Online documentation: BOOKMGR, CNSFINFO, CUINFO
- Newsletter: ForeFronts
- Training notebooks of presentations from classes and lab exercises
- Online instruction Program: TUTOR
- Online help program and man pages

Consulting

- E-mail consulting
- Large scale computing consulting
- Computational Research Associate Staff in Chemistry, Statistics, Operations Research, Astrophysics, Mathematics, Engineering, and Agricultural and Biological Engineering
- Visualization consulting
- Strategic User Program for those using parallel computing in production work
- Corporate Research Consulting

Graphics Support

- Support for remote X-Windows (including xim with WaveFront) Tektronix 4105, 4010; Versaterm for Mac; GRAF for PC; VT100 emulators; gnuPLOT and a version of xmovie
- An extensive graphics lab with high speed fiber optic links, an image processing system, facilities for videotape production, a digital camera for 35 mm slides, printers for producing camera ready copy, plotters and color PostScript printers, and a number of IBM and Unix workstations

Strengths and Limitations

Strength

parallel processing and very large memory

Limitation

limited vector processing (as compared with a CRAY)

Administrative

Allocations are approved at Theory Center at CNSF by a peer review process; small startup grants may be made before peer review process is complete.

Contact Summaries

Consulting:	(607) 254-8686 eagle@eagle.tc.cornell.edu
Technical and visualization consulting:	(607) 254-8686 (607) 255-3985 psfy@cornellf.tc.cornell.edu
Allocations:	Pat Colasurdo (607) 255-3985 pat@cornellf.tc.cornell.edu
Training:	(607) 254-8686
System Status:	(607) 255-7138
Network help:	Network Management Center (24 hrs/day, 7 days/week) (607) 255-9900
IBM 3090 addresses:	cornelle.tn.cornell.edu (128.84.252.7) cornellf.tn.cornell.edu (128.84.252.21) eagle.tc.cornell.edu (AIX) (128.84.201.1)

Login Script

The following script shows how to connect to the CNSF IBM, login, compile, load and run a program, and then logout. It assumes that you connect from some local machine which supports the TCP/IP TELNET program. Note that if you are login in from a VMS machine, you will need to use TN3270 to access CNSF.

Prompts are represented by "user>>" for you, "CNSF>" for the IBM, "TELN>>" for TELNET, and "CNus>>" for IBM responses followed by user entries on the same line. Most responses are abbreviated. Comments are enclosed in parentheses.

Note that this dialog has been tested.

```
Prompt          Dialog                        Comments

user>>          telnet 128.84.252.21          (TELNET to the IBM)
TELN>>          ...                           (TELNET messages)
CNSF>>          LOGON user-id
CNSF>>          ENTER PASSWORD OR LOGOFF (IT WILL NOT APPEAR
                WHEN TYPED): password
                                              system messages
CNus>>          fortvs hello                  (Compile the program)
CNSF>>          ...                           (Compiler messages)

CNus>>          fortlibs                      (Access libraries
                                              required to load and run
                                              program)
CNus>>          load hello                    (Load the program)
CNus>>          start *                       (Run the program)

CNSF>>          Execution begins...
CNSF>>          HELLO WORLD
CNSF>>          logoff
```

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH (NCAR)

Computer Hardware

- CRAY Y-MP8/864 with 8 processors; CRAY Y-MP2D with 2 processors
- 64 Mwords of main memory for the Y-MP8, 16 Mwords for the Y-MP2
- 48 Mword maximum memory per job for batch; 16 Mwords for interactive
- 6.0 ns clock for both CRAYs; a measured peak rate of over 1 Gflops has been achieved with a multitasked ocean model
- Vector processing hardware for both CRAYs
- 256 million word SSD for Y-MP8 (1000 Mbyte/sec channel), 128 million word SSD for Y-MP2
- 60 gigabytes of local storage for the Y-MP8, 20 gigabytes of local storage for the Y-MP2
- Unix front end
- NCAR Mass Storage System (MSS) is a hierarchical file storage system with no limit per user. The MSS has a 120 gigabyte disk farm and over 108,000 tape cartridges. It features a StoragTek 4400 Automated Cartridge System capable of holding 6,000 cartridges, or a terabyte of information. Currently, MSS stores over 19 terabytes of data. Extremely high data transfer to the CRAYs; accessible from front-end
- Connection Machine 2 (8,000 processors and floating point hardware)
- Sun 4/490 used as a gateway for NCAR's Internet Remote Job Entry System (IRJE). Allows users to create and submit CRAY jobs from their local hosts connected to the Internet. Output is automatically shipped back to the remote host

Software

- UNICOS 6.1.4 operating system on CRAY Y-MP8/864; UNICOS 5.1.11 onCRAY Y-MP2D
- FORTRAN: CFT 77 version 4.0 (default) or 5.0
- Other languages: vectorizing C and Pascal compilers

Application Libraries

ALFPACK	AMOSLIB	ECMFFT	EDA
EISPACK	EISPKD	FISHPAK	FITPACK
FUNPACK	IMSL	CRAYFISH	LINPACK
FFTPACK	MINPACK	MUDPACK	NAG
ODEPACK	SPHERE	SCI	SLATEC
SSDLIN	STARPAC	NCARG	NCARG-GKS
NCARG-LOC	NCARM	NCARO	

Graphics

NCAR/GKS Version 3.1.2

Training

- New user orientation class: One-day class to introduce Unix/UNICOS programming tools and the NCAR computing environment.
- Unix Basics Class: Two-day introduction to the basics of Unix
- Remote site visits are granted to sites with a significant number of users
- User conference held every 18 months to update users on new developments and new directions in computing at NCAR
- Site liaison workshops held biennially: intensive, in-depth presentations on specific aspects of the NCAR computing facility
- Graphics and optimization workshops are planned for the future

Collaborative Research

- User groups
- Real-time computing during field programs
- Classroom grants of computer time

Documentation

- Online documentation available for most of the utilities in the supported libraries via the Distributed Software Libraries (dsl) utility
- Scientific Computing Division (SCD) hardcopy documentation available free except for the GKS Graphics manual
- User Documentation Catalog containing references both to SCD supported and vendor documentation. Available online via anonymous FTP to ftp.ucar.edu with the filename /docs/catalog/userdoc.catalog
- NCAR UNICOS Primer: contains necessary basic information to begin computing at NCAR. Uses step by step examples to create, submit, and receive output from the CRAYs
- Daily Bulletin: Online source of up to date information on the computing systems
- Monthly newsletter: SCD Computing News
- Annual planning report: Supercomputing: The View From NCAR
- NCAR Annual Report
- NCAR Annual Scientific Report

Consulting

- Phone, 8-5 MST weekdays; walk-in consulting available for visitors and local users. Extended consulting available by appointment
- E-mail consulting available from Internet, BITNET, Span, and Omnet
- Specialized consulting for software libraries, networking and data communications, optimization, multi-tasking, CRAY I/O optimization, segmentation (overlaying) of large applications, math algorithms, NCAR Graphics, IBM PC/AT and Macintosh, and Unix and UNICOS
- Visitor assistance includes access 24 hrs/day, 7 days/week, IBM PCs and Macintoshes for terminal or stand-alone use, color graphics terminals, Canon microfilm/fiche reader/printers, community telephone for business use, documentation library (including vendor documentation)

Graphics Support

- DICOMED film recorder for 16 mm film and fiche (black and white)
- DICOMED color film recorder (35 mm color slides)
- Xerox 4050 laser printers for paper graphical output
- CGM metafile support
- Remote graphics support includes: Tektronix 4010, 4105, 4107, 4025, 4115; VT100, VT125, VT220, VT330; ADM; AED512; HP2648a, HP7475a, HP150; PC-Plot for IBM/PC; Versaterm for Macintosh.
- Output mailed to users at remote sites

Strengths and Limitations

Strengths

- High performance vector processing
- Extensive user support services
- SSD for large I/O applications
- Extensive data archives for atmospheric and oceanographic research
- High volume mass storage system
- Extremely high volume graphics output capabilities
- 16 mm movie making and video support
- Remote job entry system

Limitations

- Limited memory
- Few applications outside atmospheric sciences

Administrative

- Allocations are open to university researchers with NSF grants in atmospheric, oceanographic, and related sciences; grant requests are reviewed by a peer review board composed of NCAR staff and university researchers
- Allocations are also available to government agencies on a cost recovery basis

Contact Summaries

Consulting:	(303) 497-1278 consult1@ncar.ucar.edu
Visitor/User Information:	(303) 497-1225 scdinfo@ncar.ucar.edu
Allocations:	(303) 497-1207 knudson@ncar.ucar.edu
Documentation Orders:	(303) 497-1232 maryb@ncar.ucar.edu
IBM 4381 front end address:	evans.ucar.edu (128.117.8.18)

IRJE (remote job entry): rje@windom.ucar.edu

NATIONAL CENTER FOR SUPERCOMPUTER APPLICATIONS (NCSA)

Computer Hardware

- ❑ CRAY Y-MP4/464 with 4 processors; CRAY-2S/4-128 with 4 processors; Connection Machine Model 2 (CM-2) with 32,000 parallel processors and 32 bit floating point hardware; Convex C240 system (used for memory intensive real-time visualization)
- ❑ 64 Mwords of main memory for the Y-MP; 128 Mwords of main memory for the CRAY-2; 256 MByte main memory for CM-2; 1 Gbyte of physical memory for the Convex
- ❑ A maximum of 6.5 Mwords of main memory per user on the X-MP (see HELP MEMORY on the CRAYs for details)
- ❑ 6.0 ns clock speed for the CRAY Y-MP; 4.1 ns clock speed for the CRAY-2
- ❑ Vector, scalar, and parallel processing
- ❑ High speed 128 Mword Solid State Disk (SSD) for the CRAY-Y/MP
- ❑ 16 Gbytes temporary storage for Crays; 10 GByte DataVault for the CM-2
- ❑ Common File System (CFS) with 120 GBytes of permanent file storage running on an Amdahl 5860
- ❑ Potentially unlimited magnetic tape storage through an IBM 3480
- ❑ Plans for significant increases in mass storage capabilities
- ❑ Three IBM RISC System 6000 model 550's (high-end superscalar machines for predominantly scalar applications); there will be a total six of 550's and one RS/6000 model 950 Front-end / File Server by the end of 1991.
- ❑ Three Sun 4/490 front ends running SunOS for the CM-2
- ❑ Numerous high end machines from Silicon Graphics, Apple, IBM, and SUN in the Numerical Laboratory, accessible over the Internet
- ❑ VAX/Ultrix front end for BITNET connectivity
- ❑ New network hardware and software being installed in a testbed research project (BLANCA) to prepare for the national gigabyte transcontinental network (NREN) ; by early 1992 BLANCA should include a 622 Mbit/sec trunk to University of Wisconsin, and 45 Mbit/sec links to Berkeley and Bell labs

Software

- ❑ UNICOS is the operating system on both CRAYs. It provides interactive and batch access to a Unix operating system (based on AT&T Unix System V)
- ❑ Multitasking is supported on the CRAYs. Dedicated time is available to allow access to all 4 CPUs
- ❑ Editors: vi on the CRAYs
- ❑ FORTRAN: CFT, CFT77 and CF77; cdbx is the debugger of choice on both CRAYs, though other debuggers are available
- ❑ Other languages: vectorizing C compiler on both CRAYs
- ❑ cfs utility to move files between CFS and the CRAYs and Many example programs for vectorization and graphics on CFS
- ❑ Extensive in-house software development applications staff
- ❑ Public domain software for workstations available via anonymous FTP-connect to ftp.ncsa.uiuc.edu (or 141.142.20.50) with user-id "anonymous" and your user-id and e-mail address as the password--get the file "README.FIRST" for an informative overview of current holdings and FTP instructions. Each directory, including the root, contains a file named "INDEX" which contains a recursive listing of the files of that directory and of all subdirectories within it.

FTP'able software currently available includes: DataScope, Image, Layout, PalEdit, TELNET, Contours, GelReader, Hypercard Scientific Animation Package, Import2HDF, Reformat/XReformat, SDIFF, PC Show, ImageTool, DataSlice, X Image, PolyView, Isosurface Visualizer, and CompositeToolarchive.

Software On the CRAYs

Astronomy

MIRIAD

Chemical Engineering

ASPEN PLUS

Chemistry

AMBER
AMPAC
BROOHKAVEN PDb
CADPAC
CHAARMm
DISCO
DISCOVER
GAMESS
GAUSSIAN90
GPRLSA
MACROMODEL
MINP
MM2
MM2(87)
MOLECULE-SWEDEN
MOPAC
RANFOLD
RNAFOLD
RPAC
XPLOR

Computational Fluid Dynamics

FIDAP
FLOW3D
FLUENT
KIVA II
PHOENICS
PLOT3d
SALE3D
TURB3D

Electrical Engineering

CAzM
EMAS
HSPICE
MSC/EMAS
PISCES IIB
SIGVIEW
SPICE
SUPREM 4

Graphics

Blaze
GNUPLOT
GPLOT
MOVIE.BYU
MPGS
NCAR (GKS)
PVI Contouring
PVI DI-3000
PVI GK-2000
PVI GRAFMAKER
PVI Metafile
Zetavu

Mathematics and Statistics

ACM-Algorithms
BCS
BCSEXT
CALMATH
ECMFFT
EDA
EISPACK3
ELLPACK
FFT
GLIM
HSML
IMSL
ITPACK
LAPACK
LASO2
MINOS
MINPACK
NAG
NUMERICAL RECIPES
ODEPACK
PCGPAK
PORT
POSSOL
SCILIB
SLAM II
SLATEC
SMPAK
SPARSE
SPECFUN
SPSS-X
SSDLIN
TOEPLITZ
XMP
ZOOM

Solid Mechanics and General Engineering

- ABAQUS
- ANSYS
- DADS
- DYNA2D
- DYNA3D
- INGRID
- MAZE
- MSC/NASTRAN
- NIKE2D
- NIKE3D
- ORION
- PATRAN II
- TAURUS
- TOPAZ2D
- TOPAZ3D

Systems and Utilities

- AS
- BENCHLIB
- CDBX
- CF77
- CFT
- CFT77
- HDF
- KAP/Cray
- PASCAL
- PCC
- SCC

Training

- Education program features supercomputer use for users from kindergarten to advanced researchers; a strong emphasis also on incorporating scientific visualization techniques into education.
- Academic Affiliates Program with members at more than 100 institutions; features special training and block grants of computer time for members.
- Visitors program for faculty, postdoctoral, and student researchers to support working visits to NCSA.
- Renaissance Experimental Laboratory for teaching visualization skills and efforts to incorporate scientific visualization into course curricula.
- Monthly training workshops on introductory and advanced topics including use of the Crays, the Connection Machine, applications packages, and visualization techniques.
- Off-site classes available covering topics of interest to particular remote sites.
- Workshops and seminars on specialized topics in various disciplines.
- Summer institutes and workshops.
- Many training video tapes: vectorization, CRAY architecture, Multi-tasking, etc.

Collaborative Research

- Association with the Beckman Institute, an interdisciplinary program for artists, computer scientists, and researchers in many intellectual disciplines.
- Unix mail on the CRAYs (users are encouraged to forward mail to their home systems).

Documentation

- Unix man pages for technical information
- Documentation system (originally from CTSS) ported to UNICOS for access to complete manuals
- On-line HELP facilities on CRAYs
- NCSA Technical Resources Catalog lists documentation available from NCSA or third parties
- Innovative video magazine (NCSA RealTime)
- New users provided with an extensive startup kit and kept informed via frequent online and printed materials.
- Many documents are available for free or for purchase
- Online help is available for both the CRAY and the VAXes
- Extensive sets of example programs are available on CFS

- Bimonthly newsletters: ACCESS and DATALINK
- Annual report, entitled "SCIENCE: The State of Knowing," which summarizes NCSA's activities in the previous year

Consulting

- Consulting available via e-mail (24 hours a day) and phone (8am to 5pm central time (see Contact Summaries below)
- On-line HELP and man pages on the CRAYs, help files on the VAXes

Graphics Support

- Strong emphasis on local and remote use of scientific visualization
- Workstation tools for graphics analysis
- Scientific visualization programs, to which users may apply to have their data produced for use in high quality graphics presentations
- CGM metafile support
- Support for remote graphics terminals includes Tektronix 4014, 4105, 4113, 4115/4125, PostScript, HPGL, Macintosh
- Output is mailed to remote users
- Media Services facility features video and audio resources, including Silicon Graphics Inc. frame buffers, Abekas digital disk recorders, D1 format digital VCRs, Macintosh-based digital audio recording, Betacam SP format analog VCRs, computer-controlled editing and routing, and over 150 other components. Activities supported include transfer of images from computers to video, audio, hard copy, and film, as well as between the different formats within each of these media; media processing such as video editing, text generation, electronic paintbox, digital effects, and compositing; audio recording and editing to further supplement basic imagery; and video field production for documentary programming and special projects.

Strengths

Strengths:

- High performance vector processing
- Solid State Disk for fast internal I/O
- Scientific visualization
- State-of-the-art graphics laboratories

Administrative

- Requests for 100 or more service units of CPU time are reviewed by a joint NCSA/Pittsburgh Peer Review Board quarterly.
- Requests for less than 100 service units are made eight times a year.
- Applications for less than six service units are reviewed internally by NCSA.
- Researchers at affiliate institutions may apply for start-up grants for 1-5 hours on the CRAY Y/MP4/464 through their campus affiliate representatives.

- The Supercomputing Education Project allocates blocks of five service units on the CRAY Y/MP4/464 for faculty who use high-performance computing in their classes.

(note: service units are CPU or wall clock hours weighted by different factors for the various computers)

Contact Summaries

Academic Affiliates:	Joe Blackmon (217) 244-1100 affiliat@ncsa.uiuc.edu	
Academic & Industrial Relations Program:	Scott Lathrop (217) 244-1099 slathrop@ncsa.uiuc.edu u13006@ncsagate	 (BITNET)
Accounts / Client Administration:	Judy Olson (217) 244-0074 uadmin@ncsa.uiuc.edu uadmin@ncsagate	 (BITNET)
Consulting:	(217) 244-1144 consult@ncsa.uiuc.edu consult@ncsagate	 (BITNET)
Education Program:	Nora Sabelli (217) 244-0644 nsabelli@ncsa.uiuc.edu nsabelli@ncsagate	 (BITNET)
Faculty Program:	Melanie Loots (217) 244-2921 mloots@ncsa,uiuc.edu u26400@ncsagate	 (BITNET)
Media Services:	Vincent Jurgens (217) 244-1543 vjurgens@ncsa.uiuc.edu u14998@ncsagate	 (BITNET)
Orders for software, publications, videos:	Debbie Shirley (217) 244-4130 docorder@ncsa.uiuc.edu docorder@ncsagate	 (BITNET)
Training:	Lyle Rigdon (information) (217) 244-3659 lrigdon@ncsa.uiuc.edu	

Karen Gobble (registration)
(217) 244-4198
kgobble@ncsa.uiuc.edu

Hardware Status: (217) 244-0710

Network status: (617) 873-3400

Cray Operations: (217) 244-0710

CRAY Y-MP address:	uy.ncsa.uiuc.edu	(141.142.101.1)
CRAY-2 address:	u2.ncsa.uiuc.edu	(141.142.102.2)
CM Sun Front-Ends:	cmsun1.ncsa.uiuc.edu	(141.142.220.4)
	cmsun2.ncsa.uiuc.edu	(141.142.220.7)
	cmsun3.ncsa.uiuc.edu	(141.142.220.8)
VAX/Ultrix gateway	ncsagate.ncsa.uiuc.edu	(141.142.121.38)
	ncsagate	(BITNET)
Dial-up Access	(217) 244-0664	(2400 Baud or less)
	(217) 244-0662	(9600 Baud or less)
Anonymous FTP:	ftp.ncsa.uiuc.edu (141.142.20.50)	

Login Script

The following script shows how to TELNET to the NCSA CRAY, list files, compile and run a job, and logout. The script assumes that you connect to the CRAY from a local machine which supports the TCP/IP program TELNET. Prompts are represented by "user>>" for you, "CRAY>>" for the CRAY, "TELN>>" for TELNET, and "CRus>>" for CRAY responses followed by user entries on the same line. Most CRAY responses are abbreviated. Comments are preceded by parentheses.

```
Prompt      Dialog                                          Comments

user>>      telnet u2.ncsa.uiuc.edu                         (TELNET to the CRAY-2)

TELN>>      ...                                             (TELNET messages)
CRAY>>      CRAY-2 UNICOS 5.0.7 (u2)
CRAY>>      National Center for Supercomputing Applications

CRus>>      login: your-CRAY-login                          (login to the CRAY)
CRus>>      Password:your-password
CRus>>      account:your-account
CRAY>>                                                      (CRAY login messages)
CRus>>      u2 1% ls -la                                    (ask to list your files)
CRAY>>      .              ..             .cshrc
            .login         .profile       hello.f
CRus>>      u2 2% cft77 hello.f                             (compile program called
                                                            "hello.f", generate a
                                                            binary object file
                                                            called "hello.o")
CRus>>      u2 3% segldr -o hello hello.o                   (load the object file and
                                                            create an executable
```

```
                                                         file called "hello")
CRus>>       u2 4% hello                                 (submit executable file)
CRus>>       u2 5% cat fort.6                            (display contents of
                                                         output file)
CRAY>>       Hello world, goodbye world
CRus>>       u2 6% logout                                (logoff CRAY and return
                                                         to local machine)
```

NATIONAL ENERGY RESEARCH SUPERCOMPUTER CENTER (NERSC)

Computer Hardware

- One CRAY 2/8, two CRAY 2/4s, and an XMP 1/8 for High School Supercomputer Honors Program (one of the CRAY 2/4s will be removed sometime in early 1992).
- Memory sizes are 128 Mwords on the CRAY 2's
- Vector and parallel hardware; 2 processors on the CRAY X-MP/24, 8 processors on one of the CRAY 2s, and 4 processors on each of the CRAY-2s
- Permanent storage is implemented on the IBM-based CFS storage system
- 1500 Gbytes total mass storage
- Auxiliary computers include VAXs and other network computers

Software

- UNICOS 6.1 on the CRAY 2/8 and the CRAY XMP 1/8; The CRAY 2/4 using CRAY Time Sharing System (CTSS) will be discontinued early 1992; the other CRAY 2/4 is physically located in Colorado Springs, and runs CSOS (Colorado Springs Operating System, a derivative of UNICOS 5.1 developed by the Cray Computer Corporation).
- Auxiliary VAXs use VMS operating system
- Editors on the CRAYs include vi, EMACS, and standard Unix editors
- FORTRAN compilers: CF77 on UNICOS and F77 on CSOS
- Other languages: C, Pascal, and LISP compilers, and CRAY Assembler
- CFS is the software used for mass storage
- Example sets, sample programs, and extensive documentation can be viewed online through the DOCVIEW program
- Disks with the NERSC CTSSLINK software for IBM PCs and PC-compatibles are available free to users
- Many Unix utilities are available in the CTSS and UNICOS environments

Math

IMSL
NAG
SCILIB

Graphics

DISSPLA
GKS
GRAFLIB
NCARGKS
TV80LIB

Training

- New user workshops are available both on site and for export
- Monthly on-site UNICOS classes
- Classes are offered on supercomputer related topics
- Work in progress to develop an online tutorial service
- A high school Supercomputing Honors Program is offered each summer

Collaborative Research

- E-mail is performed with MAIL and MAILX
- Bulletin Board Server and a Mail Server machine being developed
- MFENET/ESNET networks supported by this center provide for remote logins, e-mail, and file transfers to and from nodes on these networks and on the Internet

Documentation

- Monthly newsletter, "The BUFFER"
- News is supplied by a site-supported bulletin board called "news"
- A VMS-like HELP is available

Consulting

- Phone consulting Mondays through Fridays, 8:00--11:45 a.m., 12:45-4:45 p.m.
- Online e-mail consulting via mail to consultants@nersc.gov

Graphics Support

- A DICOMED camera is available to remote users for film, slides, and fiche
- Remote graphics terminals supported include most Tektronix displays and IBM PCs and compatibles
- Output is mailed free of charge to users at remote sites
- Facilities for PostScript output are being explored

Strengths

- Highly optimized vector processing
- Large memory machines
- A network connecting energy research sites provides for collaboration and exchange of information between researchers

Administrative

- Most allocations are made by applying to the Department of Energy (DOE)

Contact Summaries

Consulting:	(510) 422-1544 (800) 66NERSC
Accounts:(passwords and ID's):	(510) 422-2888
Allocations:	(510) 422-1544
Training:	(510) 422-1544

Hardware status:	(510) 422-4283
Network status:	(510) 422-4283
Direct CRAY connection:	f.nersc.gov (128.55.64.120)

Login Script

The following script shows how to TELNET to the NERSC CRAYs, login, transfer files from a local account to the CRAY using FTP (NERSC currently has a limited number of FTP functions installed), list files, compile/load/execute a program, and then logout. It assumes that you connect to the CRAY from some local machine which supports the TCP/IP TELNET program.

Prompts are represented by "user>>" for you, "TELN>>" for TELNET, "CRAY>>" for the CRAY, and "CRus>>" for CRAY responses followed by user entries on the same line. Comments are preceded by parentheses. Most CRAY responses are abbreviated using the "..." ellipsis notation. This script has been tested from the University of Washington:

Prompt	Dialog	Comments
user>>	telnet f.nersc.gov	(TELNET to the CRAY)
TELN>>	...	(TELNET messages)
CRus>>	ID: usernumber	(enter CRAY usernumber)
CRus>>	Password: password	(enter CRAY password)
CRAY>>	...	(CRAY login messages)
user>>	ftp	(start FTP)
CRus>>	FTP> connect 128.95.137.4	(make connection with FTP to your local account)
CRAY>>	...	(FTP messages)
CRus>>	MAX.U.WASHINGTON.EDU> login user-id ctrl-z password	
		(note that the user-id and password must be entered on the same line, the ctrl-z is required to mask the password)
CRus>>	MAX.U.WASHINGTON.EDU> get hello.for hello.f	
		(now get your program with FTP your local account and send to the CRAY)
CRAY>>	...	file transfer messages from FTP
CRus>>	MAX.U.WASHINGTON.EDU> quit	(quit FTP and return to CRAY session)
CRAY>>	...	(more FTP messages)
user>>	ls	(ask to list your files)
CRAY>>	hello.f	
user>>	CF77 hello	(compile and load your FORTRAN program)
user>>	ctrl-d	(control-d logs you off the CRAY)

PITTSBURGH SUPERCOMPUTING CENTER (PSC)

Hardware

Cray Y-MP/832 with 8 processors, 32 million words of memory, and a high speed (156 Mword/second) 128 million word Solid-State Storage Device (SSD)

- A maximum of 25 Mwords per user
- 6.0 ns clock; maximum speed 2.6 gigaflops
- High performance parallel and vector hardware
- Very large temporary storage per user
- Unlimited permanent storage in IBM based Common File System using hierarchical directories
- Users can request dedicated time.

Connection Machine CM-2 with 32,768 processors, 1 gigabyte of memory, and 10 gigabytes of high speed storage on the DataVault. The processors work in parallel. Each processor has 32 Kbytes of memory associated with it, for a total of 1 gigabyte for the machine.

- Users may use 8K, 16K, or 32K processors at once
- 1,024 64-bit floating point accelerator chips
- Maximum speed in the gigaflop range
- Temporary space and permanent storage space available on the Andrew File System (afs) through the CM-2's front-ends (see later for more information on afs)
- Driven by three front-ends: CMVAX, a VAX running Ultrix, and two SUN 4-470s running Unix, SUNA and SUNB. CM applications are executed on the front-ends. Those parts of the application which benefit from parallel processing are executed on the CM-2, while those which are serial remain on the front-end and are processed there.
- Users can request dedicated time.
- Three front-ends which drive the CM-2 (see section on CM-2 above)
- Two Vax 6420s (CPWSCA and CPWSCB) running VMS from which you can reach either the Y-MP or the CM-2's front ends. Users have 10,000 blocks of permanent storage and a large amount of temporary storage.
- Two Vaxstation 5100s (PSCUXA and PSCUXB) running Ultrix from which you can reach either the Y-MP or the CM-2's front-ends. These front-ends use afs as their file system. Users have 10,000 1024-byte blocks of permanent storage on afs and a limited amount of temporary space.

Software:

Y-MP

- UNICOS
- Editors include EMACS, vi, ed and LSEDIT (Language sensitive editor for CFT77)
- FORTRAN: CFT77, and FORGE (an aid to vectorization)
- CF77 compiling system includes CFT77, automatic optimization and autotasking, and loader.
- Other languages: C (with vectorization support), Pascal
- Mass storage: Common File System (CFS) with automatic tape storage and retrieval
- A large examples system, containing sample jobs, data and the resulting output are publicly available .

- Downloadable public domain software

CM-2

- Front-ends run either Ultrix or Unix.
- Editors on front-ends include EMACS, vi and ed
- Languages: FORTRAN (cmf), C and Lisp
- Mass storage: AFS (see below)
- Examples system containing sample jobs, data and the resulting output are publicly available

Biology

ALIGN
BROOKHAVEN
CLUSTER
CONSENSUS
CONSORT
ECD
EMBL
ENZYME GCG
GENBANK
IB_TO_GB
MAKSEQ
MAXSEGS
MDPP
MSA
MSC
NWGAP
PICKEMBL
PICKGEN
PROFILE
REBASE
SEQA
SEQH
SEQHP
XRFORM
SEQ_FILE
SEQUIN
XPLOR

Chemistry

AMBER
AMPAC
AMPS
CADPAC40
CHARMM
CHELP
DISTAN
GAMESS90
GAUSSIAN
GPRLSA
GROMOS
MOPAC
MULFOLD
NBRF
POLYRATE
PROSITE
PROTIN
RANFOLD
RNAFOLD
SN
SP
ST
SWEDEN
SWISS

Computational Fluid Dynamics

FIDAP
FLOW3D
STEAM

Electrical

SPICE
SPLICE

Engineering

KIVA

FORTRAN Utilities

BENCHM
CHRPAK
CLEAN77
FORCHEK
FORTOOLS
FSPLIT
FTREF
LOOPMARK
RECIPES
TOKENS
TOOLPACK
V77

Graphics

ANIMATOR
CODEBOOK
DI3000
DISSPLA11
DRAW
DRAWCGM
DRAWP3D
EDA
GPLOT
GPLOTM
GRAPHX
GTEX
IMAGETOOL
LVR
MACGPLOT
MARCHP3D
MOVIE6
MOVIETOP3D
NAVIEW
NCARDSL
NCARGKS2
NCARGKS3
ORION
PAL2RGB
PDBMODEL
PLT2
PNMTOCGM
POLYP3D
REQUESTAPE
RLECAT
RLETOCGM
SGML
SLIDEMAKING
SMDLIB
SMONGO
TAURUS
TEXTMAKER
TIFFTORLE
TITLEMAKER

Mathematics

ALFPACK
AMOS
AMOSLIB
APML
AUTO
BAILEY
BANDIT
BCSLIB
BCSLIBEXT
BDMG
BIHAR
BIVAR
BLAS
BORMAT
BSMP
BVPSOL
CALMATH
CGLIB
CMLIB
COLNEW
COMPAR
CYCLE
DASSL
DIERCKX
DRIV
DVERK
DYNA2D
DYNA3D
EFUN
EISPACK
EISPACKC
ELEFUNT
ELLPACK
ELLPACK
FFTPACK
FFTPACK
FISHPAK32
FITPACK
FN
FUNPACK
GAMS
GBSOL
GQOPT
HARWELL
HBSMC
HSSXEV
IMSLDOC
IMSL11
INGRID
INTLIB
ITPACK2C
ITPACKV2D
JAKEF
LAPACK
LASO
LBENCH
LBENCHC
LINPACK
LINWOOD
LLSQ
LOPSI
LSOLVE
LSQR
LUSP
MAPLE
MATHLIB
MATMUL
MFFT
MINPACK
MP
MUDPACK
NAG
NAPACK
NL2SOL
NMS
ODE
ODEPACK
PCHIP
PDECOL
PDEONE
PITCON
PLTMG
POLPAK
QFEPDE
QUADPACK
RANPACK
RECIPESC
REDUCE
RKF45
SCILIB
SGEFAC
SLAP
SLATEC31
SPARBLAS
SPARSE
SPARSKIT
SPARSPAK
SPECFUN
SPLPAK
SSDLIN
SUBSET
SYMPAK
TESTLP
TESTMAT
TESTNLS
TESTNON
TOEPLITZ
TOMS
UNCMIN
VCFT
VE1
VFFTPK
Y12M
YSMP
ZERO

Mechanics

ABAQUS
ANSYS
BOPACE
FACET
MAZE
NIKE2D
NIKE3D
SAP4
TOPAZ2D
TOPAZ3D

Programming Languages

ALISP
C
C++
CAL
FORTRAN
GCC
LISP
PASCAL

Simulation

CASCADE

Statistics

APSTAT
ODRPACK
ODRPACKX
STARPAC
STATLIB
TLS

Utilities--Benchmarks/Debugging/Optimization/Tracing/Vectorization

BOUNDS
CDBX
CM_TIMER
DEBUG
DHRYSTONEC
EXPORTS
FLOWTRACE
FORGE
HPM
LIVERMORE
MACHAR
MACHINE
NASKER
PARANOIA
PERFECT
PERFTRACE
PROCSTAT
PROF
PSR
SCOUNT
SLALOM
TESTUCON
TESTVECTOR
WHETSTONE

Utilities--File Conversion / Processing

COMPRESS
CONVERT
D2S
DETAB
ETAPE
LINES
PAD
SGREP
STRIPPER
TAIL
TAR2VMS
UUENCODE
VMS2TAR
XTRACT

Utilities--File Systems

AFS
CFS

Utilities--Job handling, Accounting

BENCHLIB
CMNQS
DEDCPU
DHSC
HELPER
NQS
PSCSUB
YJANUS
YSUB

Utilities--Miscellaneous

BISON
CDECL
CONDENSE
CSORT
SETUP
SPR

Andrew File System:

The Andrew File System (afs) is a distributed network file system used on PSC front-ends PSCUXA, PSCUXB, CMVAX, SUNA, and SUNB. PSC plans to make afs available on all of its machines. Users therefore maintain one set of files, accessible from all machines. It is not necessary to keep multiple copies of files or to transfer files back and forth between the various front-ends. Automatic daily backups are done. PSC maintains documentation, examples, libraries, executables and source code on afs in a single location which is accessible from all machines. Each user has a quota of 10,000 1024-byte blocks of permanent storage. A limited amount of temporary storage is also available.

The Biomedical Initiative:

PSC received a grant from the National Institutes of Health's (NIH) Division of Research Resources' Biomedical Research Technology program to provide the biomedical community with supercomputing resources, training, and user support. Two biomedical specialists, with large-scale computational backgrounds, are available to support the supercomputing activities.

Distributed High Speed Computing:

The Distributed High Speed Computing (DHSC) project at PSC aims to provide an easy to use interface to the HiPPI (High Performance Parallel Interface) link between the Center's Cray YMP/832 and 32K processor Connection Machine. This HiPPI network link between the Cray and the CM is capable of transmitting data at rates of up to 100 MBytes/Sec. Through the use of Distributed High Speed Computing, users are able to partition applications between the Cray and the CM, thus choosing the most appropriate type of supercomputer to solve different portions of the application. Because of the vastly different kinds of problems which can be solved on the Cray and the Connection Machine, some applications will see significant speedups in overall execution time via this approach.

The DHSC project is embodied in a set of library routines, callable from CFT77 and Standard C on the Cray, and CMFortran, C*, and C-Paris on the Connection Machine. These library calls provide a simple interface to transfer data between programs running in parallel on the two machines. Control issues (such as synchronization of flow) and data conversion issues (such as parallel to serial and IEEE to Cray floating point conversions) are handled internally by the libraries, freeing the user from these low level concerns.

Training:

New User Workshops

- ☐ Cray Techniques workshop (5 days)
- ☐ Connection Machine Techniques workshop (5 days)
- ☐ Summer Institute (2 weeks)

Advanced-User Workshops

- ☐ Code Optimization (one day)
- ☐ Multitasking (one day)
- ☐ Visualization (one day)
- ☐ Optimization of FORTRAN Code for Parallel Shared-Memory Systems (4 days)

Discipline-Specific Workshops

- ☐ Introduction to Gaussian: Theory and Practice (5 days)
- ☐ National Institutes of Health Workshops

Through grants from the National Institutes of Health, the PSC offers a series of workshops dedicated to the biomedical research community, including an overview of biomedical software and databases available at PSC. Topics presented have included molecular mechanics and dynamics, macromolecular structure refinement, nucleic acid and protein sequence analysis, fluid dynamics with immersed flexible structures, and image reconstruction from Electron Microscopy. Topic-specific workshops are provided on an "as-needed" basis and new workshops are under continual development.

Documentation:

- ❑ Many vendor and hundreds of PSC publications online, including policy, allocations and user guides
- ❑ CRAY manuals mailed via UPS
- ❑ List of documents is available online
- ❑ Hot tips and news appear in BULLETIN, and rn. BULLETIN and rn are bulletin board systems on the VMS front-ends and the Ultrix front-ends, respectively. Notices are also posted on 'news' on the Y-MP.
- ❑ Online help includes man pages on every PSC system.
- ❑ PSC Users Guide mailed to all users.
- ❑ Online EXAMPLES system contains complete job setups.
- ❑ An annual report "Projects in Scientific Computing" highlights the scientific projects completed at PSC

Consulting:

- ❑ Phone consulting available M-F 9 a.m. to 8 p.m., Saturday 9 a.m. to 4 p.m. (Eastern time)
- ❑ E-mail consulting via user-id REMARKS
- ❑ Online man pages
- ❑ Discipline-specific consulting
- ❑ "life-cycle" consulting: starting with algorithm selection through data layout, programming, and program optimization for CM users.

Graphics Support:

- ❑ CGM metafile support
- ❑ CGM-based video animation system for VHS tape and videodisk
- ❑ Support for remote graphics terminals includes many devices; also PSC is willing to acquire or develop drivers for nearly any modern device on request.
- ❑ VHS tape output mailed to remote users
- ❑ On-site graphics labs with Silicon Graphics IRIS, SUN Sparcstation, IBM RS6000, and DECStation 5000.
- ❑ Capability to make 35mm color slides using Matrix Instruments SlideWriter
- ❑ Color output from Cannon CLC-500 color copier/printer

Administrative:

- Small allocations (10 hours or less) are reviewed quickly by PSC staff. Larger allocations (over 100 hours) are reviewed by the joint PSC/NCSA Peer Review Board. Intermediate size allocations (11-99 units) are reviewed internally subject to confirmation by outside reviews via U.S. Postal mail.
- Starter grants are available for any researcher who wishes to explore the use of the PSC.

Contact summaries:

	Consulting	(412) 286-4960
	Accounts	(412) 286-4960
	Allocations	Allocations Coordinator (412) 286-4960 or stock@cpwsca.psc.edu
	Training	(412) 286-4960
	Hardware status	(412) 286-4960
	Network status	(412) 286-4960
	Front-end Internet addresses	a.psc.edu (VMS) b.psc.edu (VMS) pscuxa.psc.edu (Ultrix) pscuxb.psc.edu (Ultrix)
CM-2 front-end Internet addresses		cmvax.psc.edu (Ultrix) suna.psc.edu (Ultrix) sunb.psc.edu (Ultrix)
Cray Internet address		pscymp.psc.edu

Login Script

The following script shows how to connect to the font end VMS VAX, login, create and a job which submits 'hello.f' to the CRAY, and then logout. It assumes that you connect to the front end from some local machine which supports the TCP/IP TELNET program.

Prompts are represented by "user>>" for you, "PSC>" for the frontend, "TELN>>" for TELNET, and "PSCus>>" for frontend responses followed by user entries on the same line. Most responses are abbreviated. Comments are preceded by parentheses.

Prompt	Dialog	Comments
user>>	TELNET a.psc.edu	(TELNET to the front end)
TELN>>	...	(TELNET messages)
PSCus>>	Username: user-id	
PSCus>>	Password: password	
PSC>>	...	(PSC login messages)
user>>	emacs hello.job	(create the following job
		(to submitted to the CRAY)
	#USER=user-id PW=password	(CRAY from the VAX later
	#QSUB -lM 0.8 Mw	with the csubmit command)
	#QSUB -lT 5	
	ja	
	date	
	set -x	
	cd $TMP	

```
                fetch hello.f -t 'usr$root0:[user-id]hello.f
                cf77 hello.f limsl11
                mv a.out hello.exe
                hello.exe > results
                cfs -r5 store results
                rm hello.exe hello.f
                date
                ja -st

user>>          cray
PSC>>           The Cray Station is available
user>>          csubmit hello.job
PSC>>           %CX-S-SUB_OK, Job: Hello  queued for submission
PSC>>           VAX TO CRAY:%SYSTEM-S-NORMAL, normal successful
                completion
PSC>>           VAX TO CRAY: FILE=HELLO
PSC>>           VAX TO CRAY: 1215 BYTES TRANSFERRED
PSC>>           CRAY TO VAX: %RMS-S-NORMAL, normal successful completion
PSC>>           CRAY TO VAX: FILE=$1$DUA102:[USR2.USERID]HELLO.OUT;1
PSC>>           CRAY TO VAX: 34 BYTES TRANSFERRED
user>>          logout
```

SAN DIEGO SUPERCOMPUTER CENTER (SDSC)

Computer Hardware

- CRAY Y-MP8/864 running UNICOS
- Up to 32 Mwords main memory per user
- 6 ns clock; a maximum of 2.7 Gflops for the entire system; up to 337 maximum Mflops per CPU
- Vector processing hardware
- 65 Gbytes online temporary storage
- 128 MWord SSD
- Intel iPSC/860, 64 nodes
- 8 MBytes of memory per node totaling 512 MBytes
- Peak speed of 2.6 Gflops (for 32-bit arithmetic)
- nCUBE 2, 128 nodes
- 64 nodes with 16 MByes of memory each
- 64 nodes with 4 Mbytes of memory each
- Total memory 1.3 Gbytes
- Peak speed of 420 Mflops (for 32-bit arithmetic)
- DataTree for file storage on an Amdahl 5860

Software

- UNICOS on the CRAY Y-MP
- Editor: vi, emacs, and standard Unix line editors on the CRAY Y/MP
- FORTRAN: CFT77 vectorizing compiler
- Other languages: Pascal (vectorizing), CC (ANSI C vectorizing compiler), CRAY C, AS (CRAY Assembly language)
- Extensive example programs are available.

Biology

DRAW
FASTA
GenBank DB
PIR DB
RANFOLD
RNAFOLD
SN

Chemistry

AMBER
AMPAC
BIGSTRN-3
CADPAC
CAMBGIDGE DB
CHARM
CHELP
CORMA
DGEOM
DISCOVER
DMOL
ECEPP2
GAMESS
GAUSSIAN 88
GAUSSIAN 90
GROMOS
MM2
MMTOOLS
MMX
MOPAC
MPLOT
POLYRATE
PROLSQ
PSI77
QCFF/PI
VENUS
X-PLOR

Electrical

HSPICE
NETSCAT
PRECISE
SPICE

SUPREM
UMSPICE

Mechanics

ABAQUS
ADINA
ANSYS
CONTINUSYS
CSQ
DYNA2D
DYNA3D
FACET
FIDAP
FLOTRAN
FLOW-3D
FLUENT
FLUENT/BFC
INGRID
INS3D
MAZE
MOLDFLOW
MPGS
MSC/NASTRAN
NIKE2D
NIKE3D
ORION
STARDYNE
TAURUS
TOPAZ2D
TOPAZ3D

Math

BCS
BCS-EXT
DASSL
ELLPACK
HARWELL
HOMPACK
IMSLMATH
IMSLSFUN
IMSLSTAT
ITPACKV
LAPACK
LASO
LIBSCI
MATLAB
MINOS
MINPACK
MUDPACK
NAG
NREG77
NSPCG
ODEPACK
OMNI
PLTMG
SLAP
SLATEC
SMPAK
SPARSPAK
SPSS-X
TOEPLITZ
TOMS
VECTFFT

Graphics

DISSPLA
GKSNCAR
GKSUL
GNUPLOT
HDF
MOVIE.BYU
NCARGRAPHICS
PLOTXY
VOGLE
XDATASLICE
XIMAGE

Nuclear Engineering

DIF3D
DOS
ENDF DB
MCNP
NJOY
REBUS
SABRINA
TRANSX
TWOHEX

Training

- Two-day workshops for new users are held at the beginning of each quarter and at remote sites when requested.
- Advanced workshops are available on specialized topics, such as vectorization and visualization, both on-site and for export.
- Summer Institute for those with developed code: the applications are reviewed by an SDSC committee and are open to faculty, graduate students, undergraduates, and industry.

Collaborative Research

- Visiting scientists program
- Research Fellows program for undergrads, postdoctoral, and senior staff

Documentation

- Over 150 complete user documents are available online for viewing and/or printing.
- Over 3,000 man pages are online including over 300 locally developed.
- Hot tips and news is available in NEWS.
- The bi-monthly newsletter is called "Gather/Scatter."
- Users Guide is given to all users.
- Extensive examples and instructions on their use is available online.
- Annual report titled "Science at the San Diego Supercomputer Center 19xx"
- An overview brochure that includes an application for computing resources

Consulting

- Phone consulting is available 8am-5pm Monday-Friday Pacific time.
- Online consulting is through MAIL CONSULT@Y1.SDSC.EDU
- Discipline-specific consulting is available in most applications.

Graphics Support

- A Management Graphics Solitaire-8 digital film recorder
- Matrix 6264 analog film recorder
- Lasergraphics LFR Macintosh film recorder
- Hewlett Packard Paintwriter color Macintosh printer
- Complete audio and video post-production facility for animations
- Complete set of image manipulation and conversion software
- Rendering software including Alias, Wavefront, and Renderman
- Output mailed to your site

Strengths

- MIMD parallel computing
- Networking--infrastructure and research
- Visualization
- Large collection of applications and math software
- High performance vectorization

Administrative

- Allocations for large blocks of time are reviewed by an allocation committee and must be submitted 60 days prior to each quarter
- Small allocations (1-20 hours) may be submitted any time

Contact Summaries

Consulting:	(619) 534-5100 CONSULT@Y1.SDSC.EDU
Accounts:	(619) 534-5100
Allocations:	Dr. Rozeanne Steckler (619) 534-5120 steckler@sds.sdsc.edu
Training:	Ms. Jayne Waggoner (619) 534-5124 waggoner@sds.sdsc.edu
Hardware status:	(619) 534-5100
Network status:	(619) 534-5100
CRAY Internet address:	y1.sdsc.edu (132.249.10.1)

Login Script

The following script shows how to TELNET to the San Diego CRAY, login, list files, compile and execute a simple FORTRAN program, and then logout. It assumes that you connect to the CRAY from some local machine which supports the TCP/IP TELNET program.

Prompts are represented by "user>>" for you, "TELN>>" for TELNET, "CRAY>>" for the CRAY, and "CRus>>" for CRAY responses followed by user entries on the same line. Comments are preceded by parentheses. Most CRAY responses are abbreviated using the "..." ellipsis notation. Note that the system prompts on the SDSC CRAY Y/MP currently have the form "y1-n%" where "n" is the line number

Prompt	Dialog	Comments
user>>	telnet y1.sdsc.edu	(TELNET to the CRAY)
TELN>>	...	(TELNET messages)
CRus>>	login: your-CRAY-login	(login to the CRAY)
CRus>>	Password: your-password	
CRAY>>	...	(CRAY login messages)
CRus>>	y1-1% ls hello.f	(ask to list your files)
CRus>>	y1-2% cf77 -o hello hello.f	(compile "hello.f" code and generate executable file called "hello"
CRus>>	y1-3% hello	(execute "hello" program)
CRus>>	y1-4% logout	(logoff CRAY, return to your local machine)

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Unix is a registered trademark of AT&T Bell Laboratories.

Word Perfect is a trademark of the Word Perfect Corporation.

Xerox is a registered trademark of Xerox Corporation.

How Did We Do?

We are eager to know what you thought about NUSIRG so we can improve the next edition. You can use FTP to get an electronic copy of this form from the NorthWestNet Network Information Center:

FTP Host:	ftphost.nwnet.net
directory:	nic/nwnet/users-guide
file:	feedback.doc

Send your "marked-up" file via electronic mail to: nusirg@nwnet.net

Or if you have a printed copy of this document, you can fill it out and send it by postal mail to:

NorthWestNet
15400 SE 30th Place, Suite 202
Bellevue, WA 98007

NUSIRG Evaluation Form

______	Overall Evaluation	(10 = excellent, 1 = poor)
______	Effectiveness	(10 = excellent, 1 = poor)
______	Usefulness of examples	(10 = excellent, 1 = poor)
______	Problems with examples	(10 = none, 1 = many)
______	Order of presentation	(10 = excellent, 1 = poor)
______	Comprehensiveness	(10 = excellent, 1 = poor)
______	Ease of finding information	(10 = very easy, 1 = difficult)
______	Usefulness of references	(10 = very useful, 1 = not very useful, 0 = never looked them up)
______	Level of presentation	(10 = too complex, 5 = just right, 1 = too simple)

If you have other comments and suggestions which you'd like to make, here's your chance!

Comments on Your Overall Impression of NUSIRG:

Comments on NUSIRG's Effectiveness:

Comments on NUSRIG's Examples:

All examples in NUSIRG have been previously tested. However, there are inevitably unanticipated problems at remote sites, so please let us know about any problems you experienced so modifications can be made to avoid recurrence.

Examples which gave you problems:

What happened?

What kind of computer hardware were you using? (computer, modem, etc.)

What kind of computer software? (terminal emulation program, etc.)

Other Comments?

Comments on NUSIRG's Level and Style

Other Examples and Resources for Future NUSIRG Editions:

We're constantly on the "look-out" for additional resources to include in NUSIRG. If you have suggestions, please send pointers or descriptive text to nusirg@nwnet.net or hardcopy via U.S. Post to NorthWestNet at the address listed on the first page of this form.

Optional Contact Information:

Your Name ______________________________

Position and/or Title ______________________________

User-id ______________________________

Preferred Internet Address ______________________________

Background Information

To make the most use of the comments of yourself and others, we'd like some background information about each respondent so we know how to categorize your responses.

1. Please mark the one personal identifier which best describes you.

- ___ K-12 student
- ___ K-12 teacher
- ___ university student
- ___ university professor
- ___ librarian
- ___ researcher / scholar
- ___ user services staff member
- ___ technical support staff member
- ___ computer manager
- ___ computer network manager
- ___ other

2. Years of experience using computers: _____

3. Years of experience using computer networks: _____

Thanks for your input. We'll make every effort to act on your suggestions!

INDEX