EVERY STUDENT'S GUIDE TO THE INTERNET

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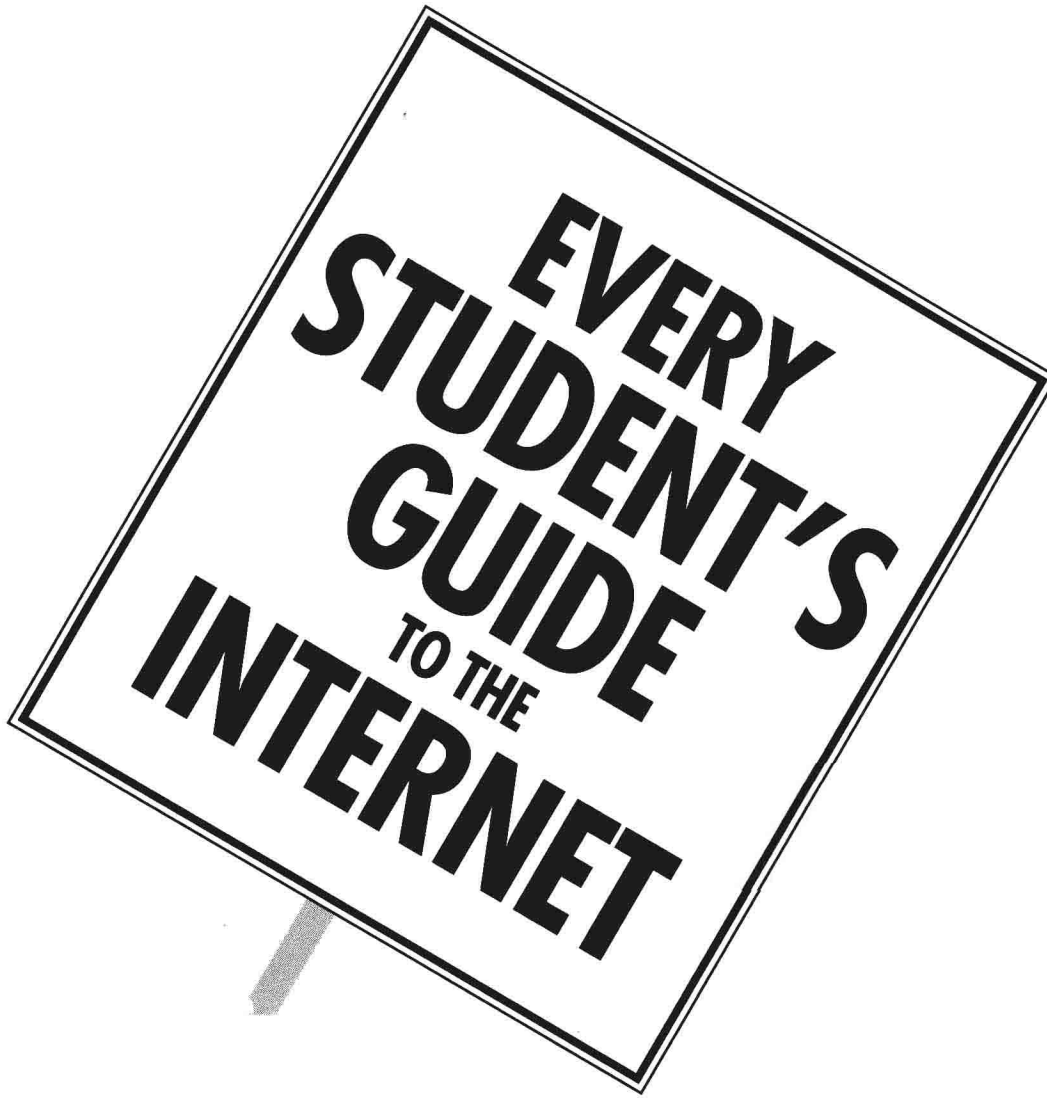

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Every Student's Guide to the Internet

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PREFACE

TO THE STUDENT

The Internet, one of the most powerful communication and information resources in existence today, gives millions of people around the world access to current and archived information on a multitude of topics. The Internet can be a tremendous help to your studies now and later in life. By following the easy-to-use instructions, *Every Student's Guide to the Internet* will enable you to search the world efficiently for information and communicate with individuals of widely divergent backgrounds.

While learning how to access the Internet, you will also learn the underlying concepts and strategies involved. Various Internet tools are discussed, along with the types of information and communication you can retrieve using those tools. The skills you learn will allow you to feel comfortable in any platform (Macintosh, UNIX, or Windows) or environment (a library index or a database at a research institute). You will find these skills invaluable in the constantly shifting landscape of the Internet.

TO THE INSTRUCTOR

Every Student's Guide to the Internet is written specifically for college and high school students, no matter what their field of study. This book can be used for short courses or training workshops on the Internet or as a supplement to courses in introductory computing, freshman orientation, and so on.

The book is organized so it can be used for teaching in the classroom or as a self-paced course. Each chapter begins with a list of objectives, and ends with a chapter summary, a list of key terms, review questions, online exercises, and discussion topics. A series of projects, list of useful Internet resources, a summary of UNIX commands, a further reading list, and a glossary of key terms are found at the end of the book.

An Instructor's Manual, free to adopters, is also available. This manual includes teaching tips, answers to review questions and exercises, additional exercises and projects not in the text.

Wherever possible, educational examples are used so students can relate concepts easily to their immediate environment. We hope to instill in readers a sense of excitement about the Internet, as well as giving them the ability to use it effectively.

This book offers the following benefits:

- Simply written with the beginner in mind, it teaches students how to access various types of information and provides strategies for finding and using resources.

- It provides access to online resources at Willamette University created specifically for use with the book: an e-mail address to which students can send messages for practice, and a listserv discussion group called **esgti-l** to which students can subscribe for practice using the listserv and for discussing topics with other students using the book. (Students can subscribe by sending the following message to **listproc@willamette.edu:**

  subscribe esgti-l <*full name*>

  A confirmation and instructions on how to use the listserv will be sent.)
- It also provides Internet online support. Students can receive help by sending a message to the listserv **esgti-l** or by contacting any of the authors via e-mail. Their e-mail addresses are as follows:

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OUR STRATEGY

The greatest challenge in writing a book like this is the dynamic nature of the Internet. Available resources and the popularity of tools on the Internet change daily. We therefore believe it is important to teach the basic concepts behind each tool so students can adapt to any platform and any tool that will be available in the future. At the same time, we set up a stable environment through the computing facility at Willamette University that students can access both for practice now and for use in the future.

We assume readers have minimal technical experience. However, they must have access to a UNIX computer connected to the Internet that has the following software: TELNET, UNIX "mail," FTP, and rn. Gopher and Lynx software for UNIX would also be helpful.

ACKNOWLEDGMENTS

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INTERNET OR BUST

Imagine that you are visiting a very large, vibrant city. From the apartment in which you are staying, you can look out over the buildings, streets, avenues, districts, and boroughs, stretching as far as the eye can see. When you leave your apartment, you are in the heart of the city, presented with a bewildering array of choices: shops, stores, museums, libraries, schools, houses, businesses of all kinds, dance clubs, restaurants, and much more! You can take nearly any kind of transport to get around town: you can hire a taxi, ride the bus, descend to the subways, ride a bicycle, or even walk. The people living here are diverse as well, more varied than the places and things to do here: some of them you'd like to meet; others, not. The things you can do here are many and varied, and with the time and energy, you can see a lot in one day. From morning to night, there is always something to do, something to see. And you will probably never see all of it, no matter how long you're there, because it is always changing.

Now imagine that the only way to get to that "city" is through your computer.

Imagine a "place," countless uncharted "places," where people meet and interact, where information passes back and forth, where all kinds of activities—scholarly, business, intellectual, and just plain fun—take place. Imagine being able to sit at your computer, seeing this virtual metropolis through your computer screen, moving back and forth by telling the computer where you want to go. There is nowhere you can't go in this vast, ethereal place, and yet you never leave the room.

This place is the Internet.

OBJECTIVES

Upon completing the material presented in this chapter, you should understand the following aspects of the Internet:

- The concept behind the Internet
- Terminology used when dealing with the Internet
- The domain names
- Available Internet resources
- Tools for using the Internet
- Guidelines for behavior on the Internet

PROLOGUE

Here you are—a new student. The person working at the registration desk, another student, says, "You probably want to get an e-mail account right away, right? Your history professor is really hooked on **the 'net**[1]. He requires everyone in his class to use it for all sorts of things." You smile and walk away, unsure of yourself. What did he mean by "all sorts of things"?

You wander over to the computer lab. A group of students is huddled around a couple of computers, all staring at one screen. You get curious. They are looking at some really nifty-looking, color images on the screen. They're gabbing about something called "Genetic Art." You get the feeling that they are using the Internet.

You've heard of the Internet and the Information Highway. Who hasn't? It's on the news everywhere. You really need to learn to use this thing. From the sound of it, you need to learn to use it right away. But where do you start? What do you have to know? How is the Internet going to help you as a student?

WHAT IS THE INTERNET?

The Internet is often referred to as the network of networks—a communication medium made possible by computers and networks. People exchange all kinds of information, in innumerable social contexts, on the Internet. Research and

[1]The 'net is a term used by many to refer to the Internet.

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information pass back and forth ceaselessly. It is a fluid and dynamic environment: It has no definite boundaries, its limitations imposed only by available software and hardware technology. It has been used exhaustively by the scientific and academic communities for many years. With the recent surge in interest by business and government, the Internet or its successor computer network will be of major importance to tomorrow's world. As a citizen of tomorrow, you need to learn how to use the tools for exploring the 'net, its information, and the people on it.

HOW WILL THE INTERNET HELP ME?

The Internet stretches from New England to New Zealand, with points of access at thousands of colleges and companies around the world. Using it, you can send a message to a friend across the ocean, obtain free software, and discuss world issues with the world. A large number of those who use the Internet are college students, and it can be a handy way to get in touch with friends and professors, both locally and from afar. You most likely have access to this global, instant connection through the school, now.

In description, the Internet sometimes seems a little bit of a pale thing. The question often asked is, "But what can it do?" This question may never be satisfactorily answered — at least, not in such a way that satisfies those who would swear by the Internet. In simplest terms, it can do this: It can send information from one computer to another. The trick is that the computers involved can — and often do — span the world. Imagine, if you will, taking the senior thesis you have just completed, sending it to your professor, who is on sabbatical in Germany, and having it arrive in a matter of seconds. Or sharing real-time scientific data between two experiments located, respectively, in Tokyo and Paris — or Dallas and Moscow — or Salem and London. Or browsing through online art galleries and exhibits at the Smithsonian from a classroom in a rural community.

You will encounter two kinds of things on the Internet: people and information. Both can help you as you progress in your academic career.

People. The Internet allows you to be in contact with people — a lot of people. There are tools, such as electronic mail and news groups, to assist you in communicating with other people, people who are interested in the same topics as you are. These people are often more than eager to help out, providing answers to questions and engaging you in thoughtful discussion.

Information. The Internet is a medium for accessing a vast amount of information. A number of tools for "information retrieval" are discussed in this book.

You can use these tools to find reference material on the Internet, such as:

- Growing collections of electronic books, from *Alice in Wonderland* to *Hacker Crackdown*
- Economic and social statistical data, such as census information, daily exchange rates, and government budgets and reports
- Fine arts and music, including digital images of art
- Historical information, including several online exhibits from the Library of Congress and the Smithsonian

It should be mentioned, however, that although the Internet is a wonderful resource, it's not perfect. For one thing, you can't find information on *everything* by using the Internet. However, you can often find out about useful alternate and supplementary sources of information not on the Internet, in addition to what you might find at your library or from your professors. For another thing, you have to be a bit more concerned with the authoritativeness of information you find on the Internet. Most of the information available online has been supplied by volunteers, and while you can often trust it, it can also occasionally contain inaccurate and misleading information. You should always be circumspect with information found online; be sure to double-check facts before citing them.

BIRTH OF A NETWORK

The evolution of the Internet and network access in general has been like the development of any other useful resource. Since its genesis in early networks, tools and utilities have been developed to make access easier and more flexible. This development continues today. It is important to understand why the Internet came about in the first place, for this history suggests the allure of computer-mediated communication today.

Our history begins in the 1960s when scientists and researchers both inside and outside of academia were confronted with a problem in communication. It was then rather time-consuming and laborious to share research information around the country; the vital centers of research were often in different parts of the country, and it was difficult to share ideas and data. For scientific research to continue and grow unhampered by geographic constraints, scientists needed a new, rapid, and dependable method of communication.

Computers were seen as a logical solution. Text was a flexible communication medium, and a computer could process and store text quite nicely, even print it out on paper if desired. If a computer could speak to another computer, text could be sent from computer to computer. The problem was in getting all the different computers in the country to talk to each other. At that time, there were many different kinds of computers, not all of them compatible, even at the same university or site! Different kinds of computers stored and processed information in slightly different formats, which meant that some kind of translation scheme was necessary for one computer to talk to another. And if more than two or three types of computers were involved, this translation could get very complicated very quickly.

The solution that arose was to have a network standard for communication. The computers would be connected to one or more other computers through physical cables (and later through wireless radio transmissions) in a giant

BOX 1.1 TCP/IP

Although most people say that the standard for the Internet is TCP/IP, IP (Internet Protocol) is the important part. The purpose of the Internet Protocol is to deliver a piece of information (called a datagram) from one machine to another by moving it from one network to another. Every machine on the Internet is identified by a unique IP address. For humans, the address is usually displayed as four numbers separated by periods (145.12.3.19). Part of the IP address specifies the network that the machine is on, and part specifies an individual machine on that network.

The Internet is a network of networks. The networks it connects are themselves networks of networks. It may continue for several levels! Typically, your university or college has some form of campus computer network. The campus network may be connected to a regional network, which serves a geographic or local area. The regional network is usually connected to a larger network, which might cover an entire country. This larger network is then connected to other large networks.

When a machine on your campus network needs to send an IP datagram to a machine outside of its local network, it uses a special machine on its network called a *router.* A router is connected to more than one network and is able to pass a datagram from one network to another. It is not uncommon for an IP datagram to be handled by 15 routers before it gets to the network (and the machine) for which it was destined!

network across the country. Any text or data put on the network would be translated, or **encoded,** into a standard format. Information received by a computer would be translated back, or **decoded,** to its own format. This allowed anyone with a computer having an encoding and decoding program to connect to this network. This network came to fruition in 1969, with the first node — the network access computer — at UCLA; many more followed. The standard established on the Internet is called **TCP/IP.** Any computer that connects to the Internet must support TCP/IP.

This strategy not only allows anyone to connect to this network by observing the standard communication protocol, but it also allows different networks to be connected to each other. When one network is connected to another, there is a site, known as a **gateway,** that connects to both networks and translates information between the two possibly widely divergent networks.

THE DOMAIN NAME SYSTEM

When an Internet site is established on the network, it is given a unique address. Whenever someone wants to access that site, the person has to specify the address of the computer. If someone wants to send e-mail to a user at a site, the sender must specify the user name of the recipient, along with the address of the computer on which the recipient has an account.

Initially, these addresses were numbers, called **Internet Protocol (IP) addresses,** but soon people realized that humans preferred names. Computers on the Internet were then also given names, called **domain names.** The IP address is composed of a series of four numbers separated by periods. For example, one of the computers at Willamette University has the IP address 158.104.1.1, and one at MIT has the IP address 18.43.0.177. Once a computer is given an IP address, it is known as an **Internet host.** The same computer at Willamette University also has the domain name jupiter.willamette.edu, and the one at MIT has domain name michael.ai.mit.edu. The domain name is series of words separated by periods.

NOTE: In the IP address and domain names, a period (.) is referred to as a "dot."

When you use the domain name in accessing a computer on the Internet, the domain name is translated by the Domain Name System program into the host's corresponding IP address. In the domain name "michael.ai.mit.edu" for exam-

ple, the Internet host "michael" is in the domain called "ai," which is in the domain "mit." That is an educational institution (indicated by "edu"). In other words, a domain name contains information about the computer system.

Just as regular mail addresses are subdivided into countries containing smaller units, such as state and city, domain names are divided into various level domains. The last word in the domain name is the **top-level domain.** The top-level domain can be either geographical location or the countries and territories the host computer is located in. They include the following:

AQ	Antarctica	FR	France	NZ	New Zealand
AR	Argentina	GR	Greece	PR	Puerto Rico
AT	Austria	HK	Hong Kong	PT	Portugal
AU	Australia	HU	Hungary	SE	Sweden
BE	Belgium	IE	Ireland	SG	Singapore
BR	Brazil	IL	Israel	TN	Tunisia
CA	Canada	IN	India	TW	Taiwan
CH	Switzerland	IT	Italy	UK	United Kingdom
CL	Chile	JP	Japan	US	United States
DE	Germany	KR	Korea	VE	Venezuela
DK	Denmark	MX	Mexico	ZA	South Africa
ES	Spain	NL	The Netherlands		
FI	Finland	NO	Norway		

If a geographic location is not specified, it is assumed to be the United States. In fact, within the United States, most network sites use the "organizational" identification for the top-level domain instead.

COM	Commercial organization
EDU	Educational and research institution
GOV	Government agencies
MIL	Military agencies
NET	Major network support centers
ORG	Other organizations
INT	International organizations

The second-to-last word gives a descriptive (or nondescriptive!) reference to the organization: you might expect stjude.edu to refer to an educational institution by the name of St. Jude's, nwnet.net to be a network service provider called NWNet, and apple.com to be a company called Apple. All other words in the domain name are subdomain within the domain — that is, subdivisions within the organization. For example, jupiter.willamette.edu and mercury.willamette.edu are both computers within Willamette University.

THE CLIENT/SERVER MODEL

Most of the programs described in this book utilize the **client/server model.** This model allows for a special relationship between the computer you are using and the (possibly remote) computer that has information you seek. Each of these pieces of software has two parts: the client part and the server part.

- The client program runs on the computer you are using. It facilitates your access of information by doing the behind-the-scenes work of opening connections to distant computers, sending your requests, and receiving and displaying results. The computer you are using could be your desktop machine or your local host computer.
- The server software runs on the computers that provide the information. A server is often a powerful computer capable of handling information requests from many clients.

Many of the tools you will use in this book follow the client-server model. When a tool is said to follow the client/server model, this implies two things about its function and dependability. The first is that unless you can access a computer that is installed with a client software, you cannot access the server. The second is that a client depends on a server being available to provide information. If the server computer is inoperative, for example, a client cannot access the information. If a server is under a heavy load of many client requests, its response will be very slow.

For most tools, you can get a version of client software to run on almost any **platform,** which refers to the kind of hardware and operating system used by the computer. **UNIX** is a platform. A personal computer running under MS-DOS is a platform. One that utilizes Microsoft Windows is a different platform. Macintosh is yet another platform.

The platform that you use influences what your client software will be like. Macintosh and Windows clients will have the same kind of "friendly" user interface they are used to from other Macintosh and Windows software products. That is, the user interface is graphical, commands will be available on a menu bar, and different information will appear in different windows and dialog boxes on the screen. UNIX clients will have the flavor of UNIX machines: the display is text-based, commands are typed at a prompt, and there is generally only one thing on the screen at a time. It is not fair to say that one platform and its clients are inherently better than others; each has its own capabilities and drawbacks that make it distinct. What you use at your site may depend on availability, cost, and the preferences of administrators at your site.

Why, then, is UNIX the standard platform for this book? UNIX has a great advantage over the other platforms in that it is a *very* common platform on the

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