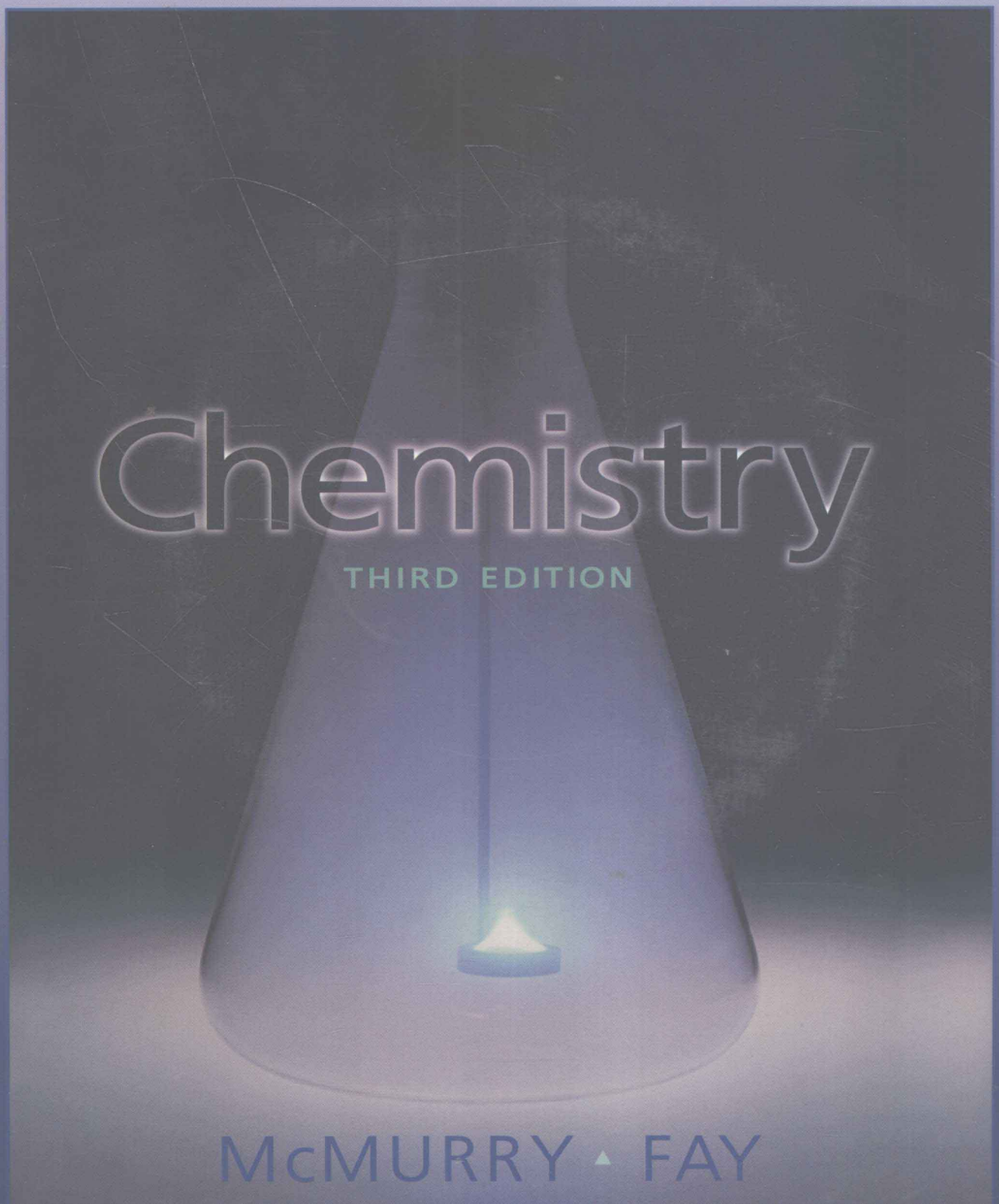
Media Companion for CW

CHERYL B. FRECH • JULIA R. BURDGE • THOMAS GARDNER



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CHERYL B. FRECH • JULIA R. BURDGE • THOMAS GARDNER

Chemistry

THIRD EDITION

McMURRY • FAY

Upper Saddle River, NJ 07458

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INTRODUCTION TO THE CHEMISTRY MEDIA COMPANION

Welcome to the *Chemistry Media Companion,* a CD/web learning environment designed to accompany McMurry/Fay's *Chemistry* 3rd edition. Using your CD and a web connection, you will have access to activities, study and testing aids, updates, animations and other movies, quizzes, molecular models, and a wide range of other content to help you succeed in your chemistry course.

The CD-ROM and the Companion Website work together and independently

In this book you will find the *Chemistry Media Companion* CD-ROM (inside back cover) and an Access Code to the *Chemistry Media Companion* website (inside front cover). The CD-ROM is dual-platform—you can use it with either a Macintosh or a computer running Windows (95/98/2000/NT). You can use the CD-ROM with or without a connection to the Internet. If you do have a connection to the Internet, you can link straight to the *Chemistry* Companion Website. If you do not, you can access the *Chemistry* Companion Website from any computer that does have an Internet connection, even without the CD-ROM. Simply direct your browser to www.prenhall.com/mcmurry.

The CD-ROM includes movies, simulations, activities, and quiz questions. The website features updates, links to interesting and helpful websites about chemistry, a gallery of 3-D molecular models, and an extensive set of practice questions that the computer will grade for you.

Using the Chemistry Media Companion *CD-ROM*

We recommend you start your journey into the *Chemistry Media Companion* with your CD-ROM. It is extremely easy to use—all the material on the CD-ROM is accessed using the Netscape Communicator browser (version 4.7). We have provided a copy of the browser on the CD-ROM in case you don't already have it.

While this CD has been designed to operate with any browser, we strongly urge you to use the version of Netscape Communicator on this CD-ROM, as the activities and movies have been optimized to run under it. If you use a version of a Netscape browser earlier than 4.08, or Microsoft Internet Explorer, you may have trouble accessing all the material on the CD-ROM.

To make full use of the power of the *Chemistry Media Companion*, you will also need to arm yourself with some software tools called plug-ins. Some of these plug-ins are used commonly on all kinds of web sites (for example, the Flash Player by Macromedia and QuickTime by Apple). Other plug-ins are

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specialized for certain disciplines (for example, the Chime plug-in for rendering 3-D molecular models is popular with chemists).

The *Chemistry Media Companion* student CD in the back of this Media Companion contains everything you need to make full use of *Chemistry Media Companion*. When you first use the CD, it will either install Netscape Communicator, version 4.73, fully-loaded with all the plug-ins you will need, OR it will install all the necessary plug-ins into your current browser. **If you do not wish to use the browser on this CD,** you might have to fetch and load plug-ins in the browser of your choice. Fortunately, these plug-ins are free for downloading and are easily accessible. However, if you do NOT want to use the browser we supply, you'll need to check to see if your system is able to handle the CD-ROM.

The easiest way to check whether your browser is fully equipped for use with the CD-ROM and Companion Website is to go to http://www.prenhall.com/mcmurry, enter the site, and click on the **Help** link at the left side of the browser window. There you will find a link to a **Browser Tune-Up**, which will check your browser to see if it is a current enough version to support the Companion Website fully, and whether all of the necessary plug-ins are installed. If not, you will find links to sites where the plug-ins can be downloaded.

As a general rule, installing a plug-in involves

- Going to the site where the plug-in installer can be downloaded
- Downloading the plug-in installer
- Quitting your browser
- Running the plug-in installer and following all the instructions there
- Restarting your browser
- Testing that the plug-in has been successfully installed

It's not a big job, but proceeding systematically is the best bet.

Once you have loaded the browser, you are ready to go. Navigating is easy—the CD-ROM matches exactly the organization of your textbook. Remember, if you have an Internet connection, you can move between the CD-ROM and the Companion Website easily. You'll notice you navigate them in exactly the same way. If you do NOT have an Internet connection, don't worry; you can go to http://www.prenhall.com/mcmurry, even without the CD-ROM, to use the Companion Website. You will, of course, need your Access Code in each case. If you've already registered on the Companion Website, you'll need your chosen username and password.

Using the Chemistry *Companion Website*

The Chemistry Media Companion Companion Website contains a number of activities that will help you learn chemistry. Navigating the Companion Website is easy; all the material is organized by chapter.

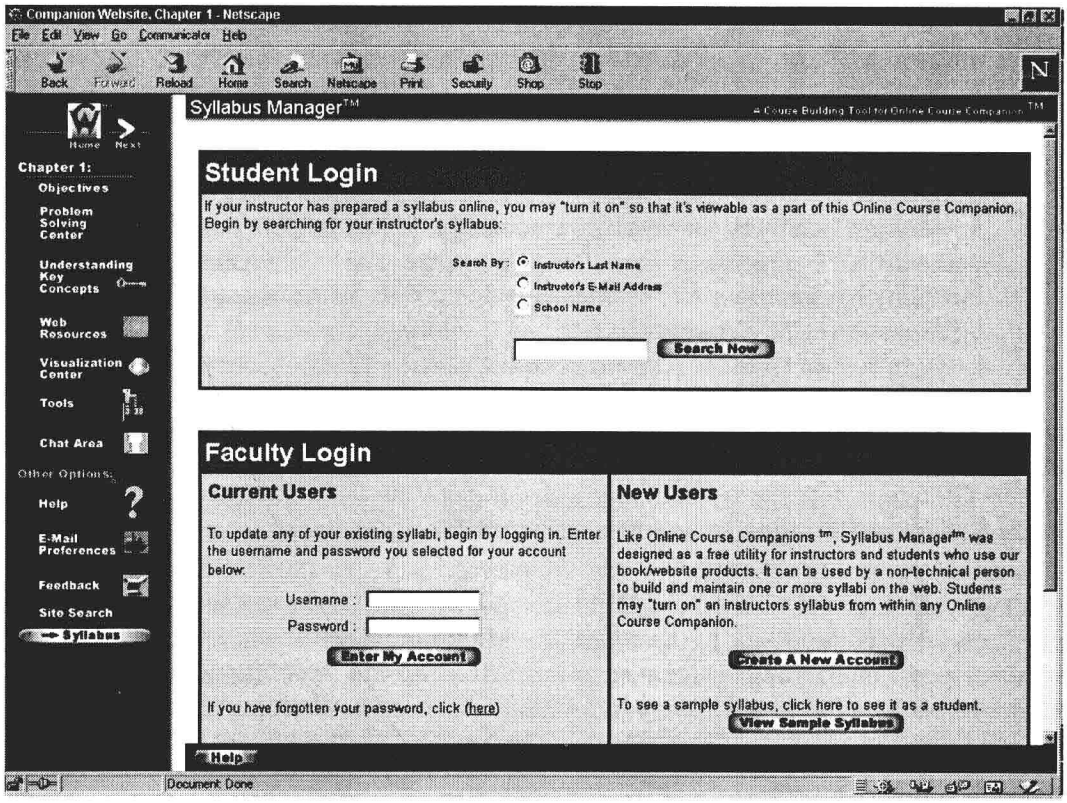
In the Companion Website you will find:

- A gallery of 3-D molecular models, which you can manipulate in real-time using Chime.
- A message board for asking questions and discussing chemistry concepts with participating students and instructors nationwide.
- A problem-solving center, where you have access to over 1500 additional quiz questions. If you take a quiz, the computer will grade it for you and send you the results immediately. If you made a mistake, you will get suggestions for how to improve your understanding, including readings in your textbook. If you need to, you can send your quiz results to your TA or instructor.
- Links to outside websites relevant to each chapter.

To access the Companion Website, you will have to register for a User ID and Password. Follow the directions in the inside front cover, where you'll find your Access Code.

Using Syllabus Manager *to see the syllabus for your class*

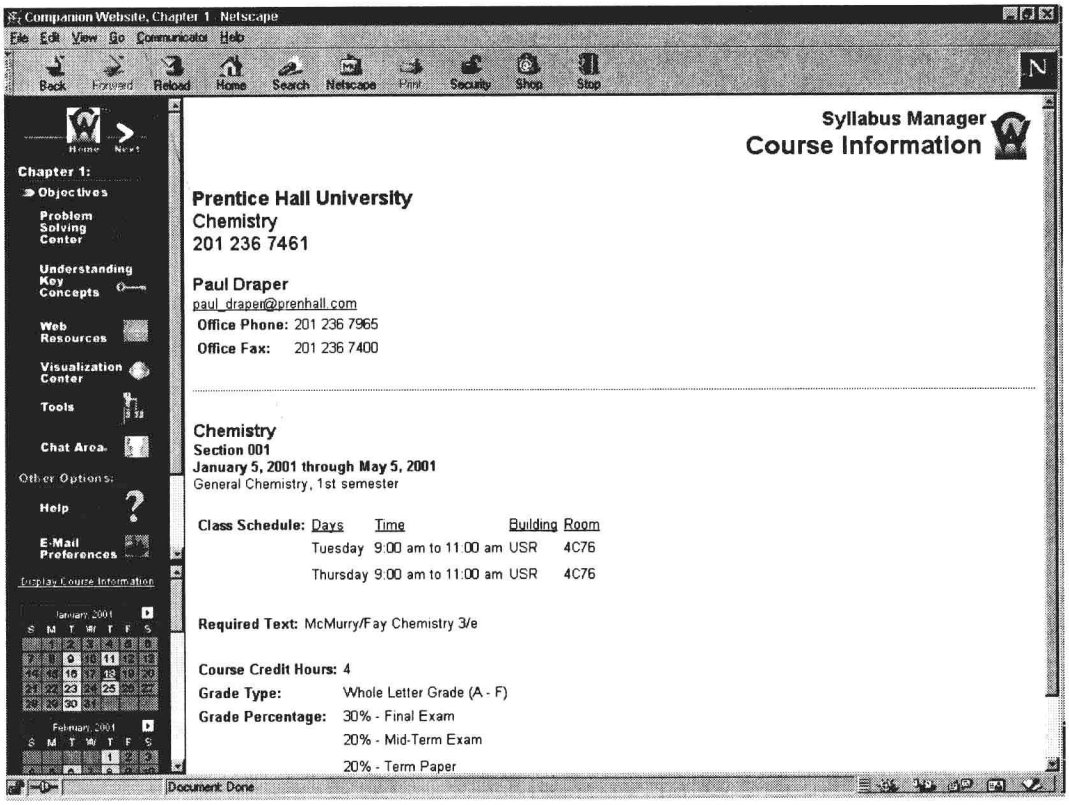
When you enter the Companion Website, you will see on the left side of your browser window a link to the **Syllabus Manager**. This is where your instructor posts course and assignment information for you. You can access this information any time you have a live Internet connection. Clicking on this link will show you a frame with a **Student Login** panel.



If you have taken this step before at this computer, you will see a list of course syllabi you have visited before. If the course you want is on this list, you can click **Login** to view that syllabus again. If the course you want isn't on this list, it's time to hunt your instructor down. You can search for your course syllabus by the instructor's last name, instructor's email address, or institution. When you do a search, the Syllabus Manager will show you everything that matches your selection. All you have to do is pick the one that matches your course. Note that your professor might have several course syllabi available, and you will be shown all the course names and section numbers. Again, all you have to do is find yours and click **Open Syllabus**.

Your instructor has the option of limiting access to this syllabus by requiring a password. Chances are your instructor gave you that information on the first day of classes. If you've lost track of that password, don't panic. You can also use this screen to send email to your instructor to beg for the password again. It's also possible that the syllabus for your class is there, but it is being held unavailable while your instructor is updating it, or that your instructor simply has not posted a syllabus.

Now that you've found your instructor's syllabus for your class, what you will see first is course information that your instructor has provided, such as office hours and telephone numbers, prerequisites, and perhaps a breakdown of the weights of assignments and exams for your final grade.



You will also notice that the left side of your screen now also sports a calendar. This calendar is at the core of how you use Syllabus Manager. You'll notice that class days are highlighted in a light gray color, and days with due assignments are highlighted an aqua color. You can also get a larger version of the month's calendar by clicking on the little triangle button at the corner of each month.

If you click on a date with an aqua color—a date with an assignment--your assignment due that day will appear. There may be several different kinds of things to do in this assignment. Your instructor may have posted some special instructions, as well. Since this is an online syllabus, it's entirely likely that your instructor would like you to do some work on the Companion Website for the textbook you're using in your class. In this case, you will see assignments of type **Online Course Companion**, and all you have to do to get to that assignment is to click the link for that component.

If you don't have time to work on your assignment right now, and you just need to take note of what the assignment is, you can also click the link for the **Printable Syllabus**. This will provide the details of the links for you to access them later.

Updating your Profile

When you enter the Companion Website, you will also see on the left side of your browser window a link to your **Profile**. This is where you record information about yourself, your instructor, and your TA. Be sure to set up your **Profile** before trying to submit a homework assignment. This is important for specifying the email address of your instructor and who you are. (You do want credit for all your hard work, don't you?)

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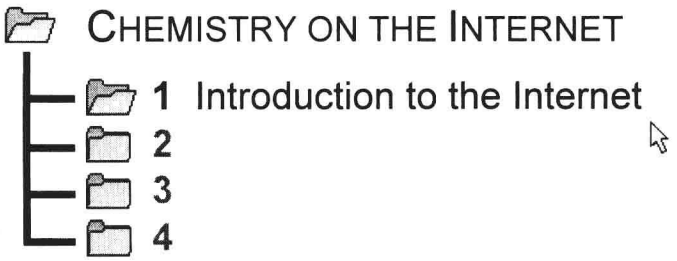

Imagine you had a chemistry textbook that was unlike any other book you owned. On the pages of this book, you had not only text and pictures, but also animations, sounds, 3-D structures that you could rotate at will, calculators built into every page, and the ability to magically call up another book on a specific topic by simply touching a phrase in the first book. Believe it or not, such a "book" exists today for anyone with access to a computer connected to the Internet, using technology that will forever change the traditions of media.

You've undoubtedly heard about the Internet from television or other media. It's hard not to these days. A TV commercial might referred you to a company's World Wide Web site (such as "http://www.something.com") that provides more information on its product, or a long-distance friend might ask you if you have an e-mail address. These are two uses of the Internet, but certainly not the limit of them. The current state of the Internet allows you to hold video phone conversations with someone on the other side of the Earth without long-distance telephone charges, search the catalogues of libraries all over the world and read the great works of literature, obtain a wide variety of software for free, watch live broadcasts of films and concerts, and remotely operate laboratory instrumentation. All these things can be done with just a computer, an Internet connection, and software that can be obtained at little or no cost.

The Internet is the latest step in the evolution of electronic telecommunications technology. Just as the telegraph introduced the ability to send text messages across great distances, telephone and radio permitted voice transmission, and television added video images to the audio, the Internet now combines all aspects of information and multimedia transmission into one generalized technology. What's different about the Internet is that it allows for a higher degree of personal freedom and interactivity. You decide what you want from the Internet, and when you want it. Many Internet sites allow you to make interactive choices on how its information is to be presented. An especially attractive feature for most people is the ability to design and produce your own publications for distribution to a global audience, without the need to go through a commercial broadcaster or publisher. What would you like the world to know?

What is the Internet?

The Internet is an ever-growing collection of several million computers in a vast global network, with each one providing information of some sort, and countless others reading that information. The computers that provide the information are known as *servers*, or *host* computers, and those that read the information (such as the computer you would use to access the Internet) are called *clients*. Each computer connected to the Internet is called a *node*. The Internet is actually an interconnection of smaller regional

networks, and it is to one of these that you connect to reach other Internet nodes (just as you must navigate a local residential road system before you can get onto an interstate highway).

Why do we have an Internet? You can thank the U.S. Department of Defense (DOD) for this (or perhaps ultimately, the former Soviet Union). During the Cold War of the 1960s, the DOD wanted to develop a more advanced communications system that would be less vulnerable to disruption in the event of war. Research began on methods of connecting computers into a network matrix that would form an interlaced web. In this way if one communication line were disabled, messages could still be relayed through other computers and then on to their destination. The development of a network that could transfer information between different types of computers was also of primary importance. As a result, the Internet is designed to be largely a platform-independent medium; that is, it can be used as easily by a PC as by a Macintosh or a Unix computer.

The agency of the DOD responsible for developing this communications network was the Advanced Research Projects Agency, or ARPA (which was formed partially in response to the launching of Sputnik, the first artificial Earth satellite, by the Soviet Union in 1957). The first network, ARPANET, went into operation in December of 1969 with only four computers (one each at UCLA, UC Santa Barbara, the Stanford Research Institute, and the University of Utah). Over time, other networks were formed for various purposes (with such names as BITNET, USENET, NSFNET, THEORYNET, and ALOHANET, to name but a few), and these new networks became interconnected into the global matrix that we now know as the Internet.

One of the first things the ARPANET researchers noticed about the network was that, aside from the tasks that it was designed to do, it was also a very convenient medium for relaying routine text messages. These electronically transmitted memoranda quickly became a significant portion of the network traffic. This ancestor of what we now call e-mail foreshadowed much of what the Internet was to become. For decades, information delivered over the Internet took the form of text messages or computer programs; however, in recent years, this has changed greatly with the introduction of multimedia and interactivity.

Spreading the Net

The Internet has come a very long way since those first four computers back in 1969. In recent years, the number of unique host computers connected to the Internet has grown exponentially to over 30 million servers. If the Internet has been around since 1970, why is it we are only now hearing about it in the popular media? Part of this must be attributed to the advent of personal computers in the late '70s and early '80s. More recently, it has been the result of advances in the way information can be presented over the Internet. Where earlier the network traffic consisted primarily of text messages, now all kinds of multimedia are possible. The commercialization of the Internet in the early 1990s, when administration of the networks was passed from the National Science Foundation (NSF) to various corporate entities, also enhanced the Internet's growth and popularity. Certainly, the ability to independently publish multimedia information freely and easily to a planet-wide audience is a major attraction to Internet users.

The Internet's exponential growth has caused some people to liken it to living thing. This analogy is not so far-fetched when you consider that most organisms are composed

of countless cells of diverse types, each with a unique function, that symbiotically interact to produce a being that is greater than the sum of its parts. With the Internet, there are millions of servers, each providing unique information to your computer. You are no longer limited to the information that your computer can hold on its hard drive, but rather now have access to millions of times as much data scattered around the world.

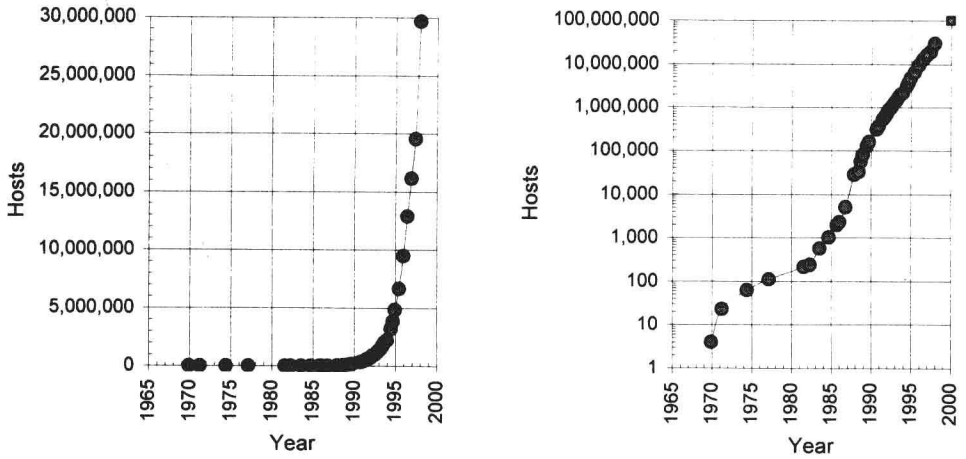

Figure 1-1. ***Growth of the Internet. These graphs (shown in linear and logarithmic scales) display the growing number of unique host computers on the Internet since the first ARPANET in December 1969.***

Types of Internet Communication

The manner in which some people perceive the Internet today is reminiscent of a fable from India, "The Blind Man and the Elephant." In this story, a group of blind men happened upon an elephant, and tried to identify it solely by touch. However, because each one of them felt only a specific part of the animal, incomplete mental images were developed that were quite different from the whole. For example, one of them perceived the elephant's tail to be a rope, while another grasped one of the legs and thought it a tree trunk. Some people who use the Internet, or who wish to begin doing so, are in a similar position; they may only use e-mail, or see the Internet as a collection of World Wide Web sites. In order to get the complete picture, let's take a moment to outline the various ways in which the Internet is used. In the next chapter, as we learn the tools for accessing the Internet, we will see specific examples of how each of these methods is used.

Remote Log-in (Telnet)

One of the oldest ways in which the Internet is used is in a process known as ***remote log-in***, or ***telnet***. To *log in* to a computer is to gain access to its contents through some security protocol (such as a user name and password); therefore, using remote log-in is to gain access to someone else's computer. This process is usually used to run a program on that remote computer. These programs commonly include searchable databases of information, and areas for posting and retrieving messages. Your campus library probably allows for telnet connections for the purpose of searching its catalog listings.

There are also many databases on the Internet providing information on chemicals, listings of journal articles, employment opportunities, and other information relevant to scientists. Areas on the Internet that allow for an exchange of messages are known as *bulletin board systems* (BBS). A BBS is a place where people can discuss various topics, either in live one-to-one chat or by posting messages that everyone else can read. Despite being one of the original methods of transferring information over the Internet, telnet is still widely used in situations where the information can be completely represented by simple text.

File Transfer Protocol (FTP)

Aside from running programs residing on a remote computer, another original intent in designing the Internet was to transfer information from one computer to another. This includes not only text files, but also binary files such as programs and images. For this reason, a ***file transfer protocol*** **(FTP)** was developed. There are a vast number of FTP sites on the Internet that house archives of software and other files of general interest. Descriptions of molecular structures can also be transferred by FTP; this is done by creating text files containing listings of atomic identities, positions in Cartesian coordinates, and information about bond connectivity.

Electronic Mail (E-Mail)

If one can transfer text files from one computer to another, it naturally follows that one can send text messages between computers. This occurred quite readily to early network developers, who found it at least as easy to send text messages to another development site as it was to telephone them. ***Electronic mail*** **(e-mail)** has become a commonplace means of communication these days, largely because of its lightning-fast speed of delivery relative to traditional mail, and its obvious cost advantage over long-distance telephone calls. An added advantage is the ability to *attach* binary files to e-mail messages, allowing you to send programs, images, or other non-text files to someone else. E-mail can also serve as a forum for discussion, much like a BBS, through what is called a *mailing list*. A message is posted to one of these discussion groups by e-mailing it to a *listserver*, which then sends it on to all subscribed members of the list.

Usenet News

For the ultimate in discussion group participation, one turns to ***Usenet News***. This is not "news" in the sense of journalistic media, but rather an extremely large BBS that is comprised of tens of thousands of specific discussion areas called newsgroups. Unlike mailing lists, newsgroups are not limited to subscribers, but rather are open to anyone wishing to post or read messages. In contrast to BBS discussion forums, many Usenet newsgroups allow the posting of binary files, thus removing the limitation of text-only postings. Some newsgroups have been in existence for many years, and as a result, recurrent topics and questions tend to appear. For this reason, a regular posting to many newsgroups is the FAQ, or Frequently Asked Questions document, prepared by one or more regularly active participants of the newsgroup. The FAQ has become such a common type of document that it appears in other contexts frequently on the Internet.

Gopher

A great leap forward in the usability of the Internet came in December of 1991, when computer researchers led by Mark MaCahill at the University of Minnesota developed a menu-driven system for presenting sets of interrelated documents over the Internet known as ***gopher*** (a homonym of "go for;" also, Minnesota's school mascot happens to be a gopher). Gopher offers directories of folders and documents (either text or binary), reminiscent of the directory trees found in most computer operating systems. Although FTP sites also use directory trees, gopher sites can also contain some menu items that allow you to jump from the site you are currently visiting to an entirely new site. Prior to gopher, navigating the Internet meant logging into one telnet or FTP site, and when you wanted to change to a new site, logging out and then logging in at the new site; with gopher, however, jumping from one site to another typically requires no such login procedures (except at protected sites). This improvement in the ease with which the Internet could be navigated heralded a period of rapid growth in its use and popularity.

World Wide Web (WWW)

The latest and perhaps greatest step in the evolution of the Internet came one year later, when Tim Berners-Lee of CERN (the high-energy physics research institute in Geneva, Switzerland) devised a system whereby the "menu list" structure of gopher was modified into more natural form called *hypertext*. In hypertext, connections to documents or other sites were mixed into the text of a document, such that key words or phrases in the body of the text acted as *links* that would lead out of the document. The second advantage to hypertext is that it allowed for the formatting of a document; instead of a plain-text document, images and other objects could be included and arranged within the document, and the text and layout of the document could be formatted. This makes hypertext documents ideal for viewing with software based on graphical user interfaces (GUI) such as Windows or Macintosh. In addition to key words and phrases of a document, the images in a document can also be made to act as links. These links not only can be to other hypertext documents, but also to gopher, FTP, Usenet, and telnet sites, and even to e-mail addresses. The formatting of a hypertext document and the definition of its links are achieved through what is called *hypertext markup language* (HTML). This consists of angle-bracketed code letters, or *tags*, placed throughout the text (such as `<B>` and `</B>` for the beginning and end of the section of text to be displayed in a bold font). The collection of hypertext documents on the Internet form a subset of the Internet known as the ***World Wide Web*** **(WWW)**, or simply "the web" for short, and the documents themselves are referred to as *web pages*. Web pages that specifically act as a main or front page for other pages in a web site, or web pages on a particular person or subject, are called *home pages*. The introduction of HTML documents to the Internet allowed for the transition from plain text to attractively and creatively designed documents comparable to what one might see in print media, but with the added features of animation, sound, and interactivity.

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