Everything You Need to Connect to the Net

A computer is a tool for your mind, and you deserve the best such tool you can afford.
To use the Net, you need a computer, software and an Internet connection. In this chapter, I will discuss what type of computer to buy, where to get your software, and the best way for you to get connected.

Even if you are already using the Net, I would still like you to read this chapter for two reasons. First, I am going to explain a lot of basic computing terms that I want you to know, and second, you may learn about something that will help improve your current setup.

**The Summary in Advance**

What computer, software and Internet access do you need?

Here is the wisdom from this chapter, condensed into a short summary. Don’t worry if you don’t understand all the words and abbreviations, I will explain them all as we go through the chapter. I just wanted to get everything into a few paragraphs to give you a preview of what we’re going to talk about. Once you have finished the chapter, you can copy this page and take it with you when you go computer shopping.

**Harley Hahn’s Quick Guide to What You Need to Use the Internet**

Buy a computer running Windows XP, with at least 128 MB of RAM (more if possible). The computer should have a fast processor, a V.90 56K modem, speakers, a microphone, a CD-RW and a built-in Ethernet port. Don’t buy a Macintosh unless you are a professional graphics designer.

For software, if you want a word processor, get Microsoft Word. For everything else, wait until you see what software comes with the computer and what you can find for free on the Net. You don’t need to buy an antivirus program right away.

Get the fastest Internet connection you can afford, either DSL or cable. Do not use a regular dialup (modem) connection unless DSL and cable are not available in your area. Choose an ISP that gives you a flat rate with reasonable customer service. Don’t use AOL unless you know for sure that you want the extra content.

**Processors**

If you were to open a computer, you would see some circuit boards, some metal boxes and various wires. On the circuit boards you would see a large number of small, flat electrical chips.
The main circuit board is called the MOTHERBOARD. The whole computer is built around this board. One of the chips on the motherboard is the PROCESSOR, the most important component of the whole computer. To the extent that a computer can be said to have a “brain”, the processor is the brain. In Chapter 1, I explained that programs were actually long lists of instructions. Well, when you run a program, the processor is the part of the computer that executes the instructions. Thus, the speed and power of your computer depend on the speed and power of the processor.

Processor speed is measured in GHz (gigahertz) or MHz (megahertz), where 1 GHz = 1000 MHz. For example, a 1.8 GHz processor is faster than a 1.4 GHz processor, which is faster than a 900 MHz processor. The speed of a computer depends on a lot more than just the processor, so you can’t say that a computer with a 1.8 GHz processor is going to be twice as fast as a machine with a 900 MHz processor. However, the first computer will be significantly faster.

Memory

Within a computer, data is organized into units called BYTES, each byte storing a single character. For example, it takes 11 bytes to store the name “Harley Hahn”. (The space counts as one character.)

When we talk about quantities of memory, we use names based on the metric system: a KILOBYTE (abbreviated KB) is a thousand bytes, a MEGABYTE (MB) is a million bytes, a GIGABYTE (GB) is a billion bytes, and a TERABYTE (TB) is a trillion bytes. So, for example, 1 MB = 1,000 KB. (There is actually a little more to it than I explain here. See the technical hint below.)

Computers have two types of memory: working memory and long-term storage. The working memory is called RAM. The name stands for “random-access memory” and is used for historical reasons, so don’t try to make sense out of it.

You will remember that I explained that the processor is the “brain” of the computer. Well, RAM is working memory, used by the processor. When you turn off your computer, all the data stored in RAM is lost. This is why, each time you turn on a computer, you have to wait for everything to reload. This is also why, when you start a new program, it sometimes takes a few moments. You are waiting for the program to be
copied from the long-term storage to RAM. (The long-term storage is the hard disk, which I will discuss below.)

Inside your computer, RAM is provided by electronic chips that plug into the motherboard. RAM is measured in MB (megabytes). The more RAM you have, the better. With most computers, you can upgrade the memory by buying more RAM chips and plugging them into the motherboard.

When we talk informally, we often refer to megabytes as “megs”, and gigabytes as “gigs”. Thus, if you were visiting the Queen of England, you might hear her tell one of her ladies-in-waiting, “On your way back from McDonalds, can you pick me up a new computer — something real fast, with at least 256 megs of RAM and a 40-gig hard drive.”

**Disk Drives**

Inside a computer, long-term storage is furnished by a number of different devices called DISK DRIVES or DISKS. Every computer comes with a HARD DISK, a small box inside the computer. The name comes from the fact that, inside this box, data is stored on several hard disk-shaped plates. Unlike RAM, data on a hard disk does not disappear when you turn off the computer. The data is stored permanently, until you (or one of your programs) erase it. In fact, when you turn on the computer, the system will spend a minute or so copying data from your hard disk (long-term storage) to RAM (working memory).

The capacity of a hard disk is measured in GB (gigabytes). Typically, a new computer will have a hard disk with a capacity of 10 to 40 GB or even more, but you don’t have to worry about the exact size. Modern computers come with enough long-term storage.

A second long-term storage device is a FLOPPY DISK DRIVE, sometimes called a DISKETTE DRIVE. This is a small box inside your computer with an opening into which you can insert a FLOPPY DISK (often called a FLOPPY). A standard floppy disk can hold up to 1.44 MB (megabytes) of data.

Some computers have an extra disk drive that uses special removable hard disk cartridges. If you have such a disk drive, you can keep large amounts of data on separate cartridges. In particular, removable hard disk cartridges are excellent for holding copies of large files and for
making backups. (A BACKUP is a copy of important data, maintained as a safeguard in case the original data is lost. It is a good idea to keep backups in a safe place away from your computer.)

You will often hear people refer to these types of disk drives as ZIP DRIVES. That name comes from a particular brand of removable hard disk made by the Iomega company. (Actually, even better than zip drives are CD-RW drives, which I will discuss in the next section.)

**What's in a Name?**

floppy disk

The outside of a floppy disk is hard plastic. However, in the olden days, floppy disks were larger and thinner, and really were floppy. Even today, if you open one up, you will find a flexible, wafer-thin disc. So inside, floppies are still floppy.

**CD Drives**

Most new computers come with a CD drive. This drive is able to work with several different types of CDs:

- **CD-ROMs**: These are the standard computer CDs. CD-ROMs can hold 650 MB of data and are generally used to distribute software.

- **Music CDs**: The CD drive in your computer can read regular music CDs as well as CD-ROMs. Thus, your computer can double as a stereo, and you can listen to music as you work.

- **DVDs**: A DVD is a special type of CD that can store computer data, sound and video. In particular, DVDs are used to distribute movies, so if your CD drive can read DVDs, you can use your computer to watch movies.

Some computers have CD-RW (rewritable) drives that can both read and write. If you have a rewritable drive, you can put your own data on blank CDs. In particular, you can make your own music CDs that can be used with standard CD players. I will discuss these drives in Chapter 10, at which time I will show you how to access music from the Internet and create your own custom music CDs.

A CD-RW drive is also useful for making backups. In fact, CD-RW drives are better backup devices than the zip drives I mentioned in the
previous section. Rewritable CDs hold more data than zip drive cartridges, and are much less expensive. If you are thinking of buying a CD-RW drive for your computer, read the discussion in Chapter 10, where you will find some important hints.

The speed of CD drives is expressed as a number followed by the letter “x” — for example, 8x, 24x, 48x. These numbers are relative and indicate the speed of the drive compared to the original CD drives. In other words, a 4x drive is 4 times as fast as one of the original CD drives; a 24x drive is 24 times as fast; a 48x drive is 48 times as fast. (In this sense, the “x” means “times”, as in multiplication.)

When you buy a computer, don’t worry about the exact speed of the CD drive, just compare the numbers. For example, a 48x drive is faster than a 24x drive, which is much faster than a 8x drive. As with most computer-related equipment, faster is better. However, having a fast CD drive is not nearly as important as having a fast processor and lots of memory.

What’s in a Name?

disk
disc

When we talk about CDs, we use the word “disc” (as in compact disc), but when we refer to hard disks and floppies, we use the word “disk”. This dates back to the original IBM PC (1981), in which floppy disks were called “diskettes”.

What’s in a Name?

CD
CD-ROM
DVD

A CD is a “compact disc”.
The name CD-ROM stands for “compact disc, read-only memory”, which indicates that the data on the disc can be read, but not changed.

Originally, the name DVD meant “Digital Video Disc”. However, for marketing reasons, the DVD industry has changed the meaning to “Digital Versatile Disc”.
Operating Systems (Windows)

An OPERATING SYSTEM is a master control program that runs a computer. Almost all computers use an operating system called WINDOWS. Windows is made by Microsoft, and every now and then, they come out with a new version. The latest version is Windows XP. (According to Microsoft, XP stands for “experience”.)

What’s in a Name?

Windows
Windows 2000
Windows NT
Windows CE

WINDOWS is a general marketing term, used by Microsoft to describe a variety of different operating systems. Informally, when people refer to “Windows”, they are usually talking about the most common PC operating systems, Windows XP/Me/98/95. However, there are other Windows operating systems you may hear about.

WINDOWS 2000 is the name for a family of operating systems used to run some commercial computers, especially servers. The ancestor of Windows 2000 was Windows NT, which was released in July 1993. In October 1998, Microsoft announced that all new versions of Windows NT would be named Windows 2000. Thus, WINDOWS 2000 is just a newer version of Windows NT.

WINDOWS CE, released in September 1996, is an operating system used with small portable computers, such as handheld and palmtop computers, as well as some video game systems. Windows CE can also be used with small specialized computers called EMBEDDED SYSTEMS, that are used within larger machines, such as cars, microwave ovens and VCRs.

You are probably wondering, what do NT and CE mean? At one time, NT meant “new technology”, and CE meant “consumer electronics”. Today, the official Microsoft dogma is that these are simple designations that never had a particular meaning.

This might be a good time to recall one of the slogans of the totalitarian government in George Orwell’s novel 1984:

Who controls the past controls the future; who controls the present controls the past.

The first Windows was version 1.0 (released in November 1985). It wasn’t until version 3.0 (May 1990) that Windows became widely used,
and even today, there are many computers that still run a version of this older system, Windows 3.0, 3.1 or 3.11. For convenience, these versions are referred to collectively as 3.x.

In August 1995, Microsoft came out with a new version of Windows that was totally different from the old ones, so for marketing reasons, they made a big change in the name. Instead of calling the new operating system version 4.0, they called it Windows 95. Since then, Windows 95 has undergone a variety of updates, under the names Windows 98 (June 1998) and Windows Me (September 2000). The newest version, Windows XP (October 2001), is a big upgrade from the older versions.

What does this mean to you? When you buy a computer, make sure it comes with the newest version of Windows already installed. Do not accept a computer with an old version of Windows.

**Software**

When you buy a new computer, it will come with a lot of free software. Not only will you get the current version of Windows, you will get a lot of programs that Microsoft includes with Windows. In addition, most computers come with a variety of other software. When something is given away as part of the overall purchase price, we say that it is BUNDLED with the main product. In this case, we can say that Windows, as well as other software, is bundled with the computer.

Having so many programs included with a new computer is convenient, as the software will already be installed and working. This is particularly important with respect to Windows, because installing an operating system is a time-consuming process with many potential pitfalls. Microsoft saves everyone (including themselves) a lot of trouble by having Windows already working on the computer when you buy it.

When you buy a new computer, the question may arise as to whether or not you should buy extra software at the same time. (If the question doesn’t arise by itself, the salesman will probably offer some “suggestions”.) Actually, you don’t really need to buy any other software right away. A new PC comes with everything you need to use the computer and to connect to the Internet. You may want some extra programs to use various Internet facilities, but you can download these from the Net for free. In fact, there is so much software on the Net — in any category you could want — that I would suggest not buying anything extra until
you have learned how to download software and explored the many software archives. (We'll talk about how to download software from the Net in Chapter 9.)

So, with one exception, I would suggest not buying anything right away. The exception is, if you know you will be doing a lot of word processing, buy the newest version of Microsoft Word. This product is pretty much the standard in its category, and can be bought as part of a collection of programs called Microsoft Office.

Such collections are called software SUITES. Other companies besides Microsoft offer suites, and they provide good value. Some computers come bundled with a suite of programs, so you may get what you want for free anyway.

One last question: it is common for salesmen to suggest you buy an antivirus program to protect your computer. Should you do so? I won't talk about computer viruses now (we'll do that in Chapter 12). However, I will say that the dangers posed by viruses, even on the Internet, are highly exaggerated by the companies that sell antivirus software, and by people who like to scare other people.

It is not necessary to pay extra for an antivirus program when you buy a new computer. Once you get connected to the Net, you will find a variety of free and inexpensive antivirus software to choose from. In addition, many new computers already have such software installed on the machine.

As far as Internet software goes, I explained in Chapter 2 that you access the Internet by using client programs. The most important client program is a browser, which you use for the Web and other services.

All the Internet clients you need are available on the Net. To get started, you need only (1) the software that makes the actual connection to the Net (this software is included as part of Windows), and (2) a browser. Once you are on the Net, you can use your browser to get whatever you need.

When you buy a new computer, chances are it already has a browser, probably Microsoft's Internet Explorer. If not, you should be able to get one from the company that provides your Internet connection. Don't worry about getting the newest version of the browser. Any browser will

**hint**

I will discuss computer viruses in Chapter 12. If you are worried, the following three precautions will provide the protection you need until you learn more.  
- Never open a file that someone has sent to you by email.  
- Never use a floppy disk to transfer a program from someone else's computer.  
- Never allow your children to bring home floppy disks from school.
hint
Both Microsoft and Netscape offer free suites of Internet software. Aside from a browser, each suite contains a variety of other Internet client programs, all of which are integrated to work well with one another.

do to start. Once you get on the Net, you can download the newest versions of Internet Explorer or Netscape. (These are the two major browsers.) We will talk about browsers in more detail in Chapter 7.

What Type of Computer Should You Buy?

What type of computer should you buy to use the Internet? You have two basic choices: a regular computer or a special-purpose Internet computer. Most people use regular computers, so let’s talk about those first. In this section, I’ll summarize the points we have discussed so far and tell you what to buy.

When it comes to computers, you can get a PC or a Macintosh. Get a PC. Virtually all software and all new development, especially on the Internet, is for PCs running Windows. If you get a Macintosh, you will be left out of the mainstream.

Your computer should come with Windows XP already installed. As I explained earlier, the computer should have at least 128 MB of RAM (memory) — more if possible. In addition, make sure the computer has a CD-RW drive and speakers. I suggest that you also get a microphone (often included). This will allow you to talk to other people over the Net, and to record voice messages which you can send by email.

Make sure the computer’s processor is fast. As I explained earlier in the chapter, processor speeds are measured in GHz, MHz (gigahertz) and MHz (megahertz). Within the same family of processors, all you need to do is compare the numbers. For example, a processor running at 1.8 GHz is faster (and better) than one running at 1.1 GHz. When it comes to processing power, you get what you pay for, so if you can afford it, pay more for a faster processor.

Most PCs use processors made by the Intel company. Although other companies make processors, Intel spends a lot of money trying to convince people they should only buy computers with Intel processors. Forget the advertisements. Although most PCs do have an Intel processor, it’s okay to buy a computer with another brand. Just make sure you get a fast processor, and you will be okay.

Finally, make sure that any computer you buy has the facilities you need to connect to the Net. For fast connections such as DSL and cable (discussed later in the chapter), you will need an Ethernet port. For slow connections, you will need a modem (also discussed later).
ETHERNET is a technology used to connect computers into a local network. For example, if you have more than one computer in your home, you can connect them into an Ethernet and share resources, such as files and printers. Many businesses and schools have Ethernets.

An ETHERNET PORT is a socket you can use to connect your computer to a network. When you use DSL or cable for Internet access (discussed later), you actually connect to a network, so you need Ethernet capability. Even if you don’t plan on using DSL or cable right now, you probably will later, so make sure your computer has a built-in Ethernet port. Otherwise, when you need it, you will have to install a special Ethernet adapter in the machine. (You will sometimes see such an adapter called an Ethernet NIC or network interface card.)

With respect to modems (discussed later), make sure the computer has a 56K V.90 modem.

What about the other parts of the computer? For example, do you need to worry about the size of the hard disk? If you follow the advice I have given in this section, you don’t have to worry about anything else. The size of the hard disk is important (as are other considerations), but if you get the type of computer I recommend, it will include everything you need.

**How Much Should You Pay for a Computer?**

How much you should pay for a computer is an important question. The best answer is that it’s cheaper in the long run to make sure you don’t pay too little. Here is why.

Computer technology changes quickly, and every few months, new, more powerful computers come on the market. Moreover, computer software changes just as fast, and the new programs will not work well on the old hardware. For example, the current versions of Windows (XP and Me) will not run on the machines that were suitable for the older versions. As a general rule, new programs don’t run well on old machines, because the programmers who design the programs depend on the power, speed and increased memory of the newer computers. However, software is being improved all the time, and you certainly don’t want to be stuck with old programs.

This is why computers become obsolete so quickly: it’s because software becomes obsolete, and you need a new computer to run the new software.
This consideration is important when you buy a new computer, especially when you plan to use it to access the Internet. No matter what machine you buy, I guarantee that two years from now it will look old, and three years from now it will be screaming to be replaced.

Thus, instead of buying the most inexpensive computer, I want you to spend a little more now and buy one with a faster processor and more memory. My goal is for your machine to last three years, rather than two.

Of course, nobody will make you buy a new computer in two to three years. If you want, you can use one for five years or more. There are no Internet police who will arrest you for trying to run new programs on old machines. However, the programs won’t run well, and maybe they won’t run at all.

For this reason, I suggest that — in the U.S.— you spend at least $1,000 for a new computer (including the monitor). The number, of course, is a guideline, but if you follow my advice I know you will be pleased with your computer, and it will serve you well for as long as possible. In today’s marketplace, computers are commodities, which means that brand names aren’t all that important. What’s important is to recognize that the more you pay, the more you get; and the more you get, the longer it will last without becoming obsolete.

I want you to remember that a computer is a tool for your mind, and you deserve the best such tool you can afford. A friend called me recently and said, “I went computer shopping, and I can’t decide whether I should buy my son a $500 computer or a $1,000 computer. What do you think?”

“That depends,” I told him. “Does your son have a $500 mind or a $1,000 mind?”

Types of Internet Connections

Once you have a computer and software, you need to arrange two things in order to use the Internet.

You need to buy Internet access from an INTERNET SERVICE PROVIDER or ISP. (We will discuss how to choose an ISP later in the chapter.) For this service, you will pay a monthly fee. Some ISPs also charge a one-time setup fee.

You will also need to arrange a way to connect your computer to the ISP.
For a home computer, there are three choices:

- DSL
- Cable
- Dialup connection

DSL and dialup use a telephone line, while cable uses the same line that brings your TV service. There are various details you need to know, so I will discuss each of these choices later in the chapter.

The table in Figure 3-1 shows the various ways to connect to an ISP. Dialup connections are available everywhere. For the other services, you will have to check what is available in your area. If you have a choice, go with the fastest service you can get.

<table>
<thead>
<tr>
<th>Name</th>
<th>Speed</th>
<th>Connect via</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSL</td>
<td>Fast</td>
<td>Regular telephone line</td>
</tr>
<tr>
<td>Cable</td>
<td>Fast</td>
<td>TV cable</td>
</tr>
<tr>
<td>Dialup</td>
<td>Slow</td>
<td>Regular telephone line</td>
</tr>
</tbody>
</table>

**The Speed of an Internet Connection**

When you connect to the Net, the most important consideration is the speed of your connection. Faster is better, and a lot faster is a lot better. In fact, you can’t get a connection that is too fast.

Why? Your mind works quickly, and no matter how fast you connect to the Net, the information will never appear fast enough for your brain. Waiting is irritating and interferes with your thought processes.

The main communication links inside the Internet are very fast. However, what you see on your computer is considerably slower. This is because, no matter how fast data travels within the Net, it must pass through one last link — the one to your computer — and that link is always the slowest. For this reason, when you arrange for your Internet connection, you should get one that is as fast as possible.

To measure speed on the Internet, we describe how much data is transmitted per second. However, before I can explain the terminology, we
need to talk about how data is organized within a computer. Earlier in the chapter, I explained that data is measured in bytes, where each byte holds one character. Inside a computer, a byte is actually stored as a series of smaller entities called BITS. There are 8 bits in each byte, so that it takes 8 bits to store a single character.

Consider the name “Harley Hahn”, for example. This name consists of 11 characters (counting the space) and hence, within a computer, would be stored as 11 bytes, which is the same as 88 bits.

**What’s in a Name?**

- **bit**
- **byte**

Within a computer, data is stored as bits (8 to a byte). Mathematically, it is possible to work with bits by representing them as numbers using the binary system. Within the binary system, each bit is represented by a single digit, either a 0 or a 1. The word “bit” stands for “binary digit”.

The word “byte” doesn’t stand for anything in particular. It’s just a cute word that was chosen to represent something that was bigger than a bit. Since it could be confusing to have both bits and bites, we spell it with a “y” (byte).

By the way, just for fun, here is the word “Harley” encoded as bits:

<table>
<thead>
<tr>
<th>H</th>
<th>a</th>
<th>r</th>
<th>l</th>
<th>e</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>01001000</td>
<td>01100001</td>
<td>01110010</td>
<td>01101100</td>
<td>01100101</td>
<td>01111001</td>
</tr>
</tbody>
</table>

On the Internet, we measure speed in BITS PER SECOND, usually abbreviated as BPS. For example, if I tell you that a particular connection to the Internet has a maximum operating speed of 56,000 bps, it would be the same as saying you can transmit up to 7,000 bytes per second through that connection. In practice, we mostly use such numbers to compare relative speeds. For instance, I might say that 56,000 bps is significantly faster than 33,600 bps, but not nearly as fast as 128,000 bps.

To make the numbers easier to manage, we use the abbreviation K to mean 1,000. For example, instead of saying 56,000 bps, we would write 56K bps. Similarly, we would say 33.6K bps or 128K bps. We also use M to mean 1,000,000. For example, you might read about a 1.5M bps connection.

A related term, BANDWIDTH, means the capacity to transmit data. For example, a 128K bps (128,000 bits per second) connection has about
four times the bandwidth of a 33.6K bps connection; a 1.5M bps connection has a great deal more bandwidth.

On the Net, we sometimes use this word more generally. For instance, you may see people complain that spam (unsolicited advertising) wastes a lot of bandwidth.

**Analog and Digital**

Before we continue, I want to digress for a moment to discuss an important topic: the difference between analog and digital. (If you live in the U.K., you can pretend we are talking about analogue and digital.)

We use the word ANALOG to describe quantities that can vary continuously from one value to another. We use the word DIGITAL to describe quantities that can take on only specific, discrete values.

The most common way to appreciate these differences is to think about analog and digital clocks. An analog clock is an old-style one, with hour and minute hands. A digital clock shows you exact numbers. If you look at an analog clock, you might say the time is “a quarter to six” or “just past eleven”. With a digital clock, you would see an exact time, 5:45 or 11:02.

Here is another example. In a car, an analog speedometer has a needle that moves back and forth. You might look at such a speedometer and say, “We are traveling somewhere between 50 and 55 miles per hour.” If your car has a digital speedometer, you would see an exact number, say, 52 miles per hour.

Within a computer, all data is stored in a digital format as exact values (the bytes and bits we talked about earlier). This makes the data easy to manipulate (for a computer). Moreover, as this short example will illustrate, digital data is less susceptible to error than analog data.

Singing is an analog experience, so imagine yourself singing a tune that you just made up. You sing the tune to a person, who then sings it to another person, who then repeats it to another person, and so on. After several such transmissions, the tune probably wouldn’t sound much like the original.

Now try a digital experience. You write down a list of ten numbers on a piece of paper. You then give the list to another person who copies the numbers onto another piece of paper and passes it to a third person. This
person copies the numbers once again and passes them to a fourth person. As long as you can all read and write, you can transfer the digital data (in this case, numbers) as many times as you want without introducing mistakes.

And this is how it works on the Internet. All the computers and communication links (with one important exception) are digital, and data is passed from one computer to another with a minimum of errors. This is not to say that there are never mistakes in a digital system — after all, it is perfectly possible to write down a set of numbers so that one or two of them are illegible — but the Internet has ways to find such errors and correct them. (This is done by TCP, which I discussed in Chapter 1.)

**Modems**

Everything on the Net is digital, with one important exception: the link between you and the Net. The signal that goes over the telephone line or cable is actually analog, so you need a way to convert outgoing digital data (inside your computer) to analog data (for the phone line or cable). Similarly, incoming data (from the phone line or cable) has to be converted to digital data (for your computer). All of this is done automatically by a device called a MODEM.

Each type of connection requires its own type of modem. For a dialup connection, you can use the regular modem that came with your computer. For a DSL or cable connection, you will need a special DSL or cable modem. Telephone and cable companies usually make it easy for you to buy or rent the type of modem you need when you use one of these services.

**What's in a Name?**

**modem**

In technical terms, the process used to convert digital data to analog data is called MODULATION. The process used to convert analog data to digital data is called DEMODULATION. Thus, the device that performs these jobs is called a modem: a modulator/demodulator.

**Dialup Connections**

A DIALUP CONNECTION uses a modem and a regular telephone line. To access the Net, you run a program that causes the modem to dial the phone number of your ISP (Internet service provider). At the other
end, another modem answers the phone and connects to your modem. Your program then sends your user name and password to log you in. You are now on the Net.

Before there were faster alternatives, virtually all Internet access from home computers was via a dialup connection. Even today, many people still connect to the Net in this manner.

There are three main advantages of a dialup connection: it is available everywhere, it is convenient if you travel with a computer, and it is cheap. Moreover, virtually all new computers come with a modem, and a dialup account with an ISP is economical. (In the U.S., it only costs about $25/month.)

There are two disadvantages. Most importantly, dialup connections are slow. Even the fastest such connection can be irritatingly slow compared to DSL or cable.

The second disadvantage is that a dialup connection ties up the telephone line, so you can’t use the Net and talk at the same time. For this reason, many people install an extra line just for Internet access. This is convenient, but it will pretty much double your monthly cost.

Modern modems are advertised as running at 56K bps. However, this number is misleading in two ways.

First, the number is a theoretical maximum. Analog phone lines are susceptible to electrical noise, and this noise decreases the speed at which your modem can make a connection. A 56K modem, even with a good telephone line, will often connect at somewhere between 30K and 45K. Moreover, in the United States, the FCC limits the maximum speed to 53K.

Second, 56K modems work at this speed only with incoming data (downloading). With outgoing data (uploading), 56K modems behave like the older 33.6K modems. The reason is that, for outgoing data, the change from digital (your computer) to analog (the phone line) causes problems that restrict the modem’s speed. This discrepancy isn’t as bad as it sounds, though, because most of the time you are downloading data to your computer, not uploading data to the Net.

Once you have some experience, you will notice that modem advertisements (and computer salesmen) never volunteer the knowledge that your modem will not give you the advertised speed. You might ask, don’t
the modem manufacturers and the salesmen know about this? The answer is, of course they do. However, before you judge them too harshly, consider the following real-life observation:

Traditionally, modems have been advertised with speeds that are theoretical maximums, never to be seen in real life. Today, this tradition is honorably continued with the newer forms of connectivity. For example, the people who sell DSL and cable access (which we will discuss later in the chapter) exaggerate horribly about the speed you will get. (In fact, if this were not a family book, I would say that the cable modem people lie through their teeth.)

**Upstream and Downstream**

In Chapter 2, I explained that receiving data from the Net is called downloading, and sending data to the Net is called uploading. We use similar terminology to describe the direction of data transmission: **DOWNSTREAM** and **UPSTREAM**.

When you use the Internet, you tend to receive a lot more data than you send. For example, with the Web, you click your mouse and type a little, and in return, you receive huge amounts of data: text, pictures, sounds, animation, even video. For this reason, the technologies used for high-speed consumer Internet connections are designed to devote more of the available bandwidth for downstream transmission than upstream transmission. When the bandwidth is distributed unevenly, we say that it is **ASYMMETRIC**.

The reason I mention this is that both DSL and cable are asymmetric services. For example, you might see an advertisement for a DSL service that offers 256K downstream, but only 64K upstream.

**DSL**

DSL (Digital Subscriber Line) is a technology that allows high-speed Internet connections over telephone lines. DSL is fast, and if it is available in your area for a reasonable price, it should be one of your top choices for an Internet connection.

DSL uses a regular phone line without interfering with the voice service. Thus, a single line can support both voice and a high-speed Internet
connection at the same time. DSL is much faster than a dialup connection. I can’t tell you an exact speed, because phone companies offer various services, but, at a minimum, you should be able to get several hundred thousand bps (bits per second), and perhaps, much faster.

A DSL connection is always turned on. With a dialup connection, you are not on the Net until your modem dials the phone and makes the connection. However, with DSL, you are connected permanently, until you either stop the service or die (whichever comes first).

To use DSL, you need three things: DSL service from your phone company, an account with a DSL Internet service provider (ISP), and a DSL modem. The DSL modem connects to your computer via an Ethernet port, so if your computer does not have such a port, you will have to install an Ethernet adapter.

Cable

Cable Internet connections are provided by cable TV companies. Such connections use the same wire — called COAXIAL CABLE — that is used for television. However, the Internet signal is separate from the television signals, so you can use the Internet and watch TV at the same time (although I don’t recommend it, as you run the risk of having your brain explode).

Like DSL, cable connections are fast. Also like DSL, cable connections are asymmetric, with more downstream than upstream bandwidth.

Cable connections are usually easy to arrange. Your cable company will supply you with everything you need, including a cable modem and an Ethernet adapter for your computer (if your computer does not have an Ethernet port). In addition, the cable company may also be your ISP, providing Internet access as well as the connection.

When you check out prices, you will have to factor in all this information. There will be a significant startup fee, which will include installation and the Ethernet adapter. But the monthly fee will cover the use of the cable modem as well as Internet access. Remember, also, you do not need to pay for an extra phone line.

Compared to dialup connections, cable Internet connections are great, but there are some caveats. First, you should realize that you are sharing
the cable with everyone in your neighborhood. As more people use the
cable, there will be less bandwidth for you, and the speed of your con-
nection will decrease, especially during times of heavy use. This is not
the case with DSL.

Second, the speed you get will be fast, but not as fast as the cable com-
pany's advertisements will lead you to believe. One common number you
will see is 10M bps. This is because cable modems connect to your com-
puter via an Ethernet port, and the theoretical maximum for Ethernet is
10M bps. Don't believe it. The speed they provide won't be anywhere
near this number.

Let me tell you about a real-life example. I have a friend who shall
remain nameless (Josh Addison) who uses a cable Internet connection.
As an experiment, Josh and I decided to test the speed of his connection.
According to the cable company, Josh's connection can support 10M bps
(which we know isn't true), and he should get at least about 4M bps
downstream. Upstream, Josh should get 768K bps.

To run the test, Josh downloaded a large file from one of Microsoft's Web
sites. (The file was the then-current version of Internet Explorer, which
measured 10.631 MB.) As a control, I downloaded the same file to my
computer. I have a very fast, dependable connection called a T1. A T1
connection (which is very expensive) has a maximum speed of 1.544M
bps. We ran the test on a Sunday afternoon, a typical time for a home
user to be accessing the Internet.

The results were as follows. Josh's cable connection downloaded the file
in 8 minutes and 2 seconds, an average speed of 176K bps. My T1 line
downloaded the file in 1 minute 22 seconds, which works out to 966K
bps.

Compared to the large bandwidth the cable company promised, 176K
looks small, and some people might be disappointed. However, 176K —
a real 176K — is not all that bad. Realistically, 176K is more than five
times the actual speed you get with a 56K modem, and cable is a lot more
convenient. There's no need for an extra phone line, and you don't have
to wait for a modem to dial a number and connect each time you start a
new work session.

Josh loves his cable connection and is completely satisfied, especially
when he compares it to his old dialup connection. For me, 966K is like
greased lightning (to coin a phrase), and I wouldn't want to live without
it. However, my T1 costs a lot of money, and Josh pays only $40/month.
What Type of Internet Services Are Available?

In order to use the Internet, you will need to pay money to someone. This is not a usage fee, as the Internet itself is open to everyone. Rather, you are paying for a connection to the Net. There are a variety of Internet services you can purchase, so it’s a good idea to understand what is available. I’ll explain each one in turn, but let’s start with the full list just to get an overview:

- Basic access
- Mail
- Usenet news
- Web site hosting
- DNS service (custom address)

The basic service you need is access to the Net. To get Internet access, you arrange an account with an Internet service provider (ISP). You pay a monthly fee, and in return, they arrange for you to connect to the Internet through their system.

Just having a connection provides you with access to a lot of the Net, including all of the Web. However, you do need at least two other services: the use of a mail server and an email address (so you can send and receive email), and access to a Usenet news server (so you can participate in Usenet discussion groups). ISPs generally provide email and Usenet news for no extra cost when you pay for basic Internet access.

In addition, there are two other services you may want: Web site hosting (so you can have your own Web site) and DNS service (which allows you to have a personalized address, like harley.com). We’ll talk about these topics later in the book.

Although your ISP will probably offer all these services, you do have choices. It is possible to buy your basic access from one ISP, and get mail, Usenet, Web site hosting and DNS from other providers. In fact, mail service and Web site hosting are widely available for free. The catch is, you will have to look at advertisements when you read your mail, and your users will have to look at advertisements when they look at your Web page. We will discuss all of these issues later in the book.
The important point is that basic Internet access can be unbundled from anything else. Just because you use one ISP for basic access doesn't mean you have to depend on the ISP for everything.

Why You Might Want Two Internet Accounts

Most people have only one Internet account, but in some circumstances you may want an extra one.

Let's say that your home Internet connection is a fast one (DSL or cable), but when you travel, you like to carry a notebook computer so you can check your mail no matter where you are. Unfortunately, your portable computer will not be able to access your home connection. The only way to use the Net when you travel is via a modem and a dialup connection.

For this reason, you may want to maintain two accounts: one for fast access at home, another for dialup access whenever you travel. The two accounts do not need to be with the same ISP.

Finding Internet Service Providers (ISPs)

One of the two most common questions people ask me is, “How do I find an Internet service provider?” (The other question is, “How many copies of your books should I buy?”) In this section, I will discuss how to find and select an ISP, so you can understand the choices and make a wise decision. (The answer to the second question, by the way, is, “One copy for everyone you know.”)

Do not begin to look for an ISP until you have chosen the type of Internet connection you want. Start by checking to see if DSL or cable is available where you live. If DSL or cable is available, it should be your first choice. If neither of these services is available in your area, you will have to use a dialup connection.

Once you have decided how to connect to the Net, you can choose your Internet service provider. This is the company that will provide you with Internet access. If you use a cable connection, you probably won’t have a choice — the cable company will be your ISP (or will arrange for an ISP). With other types of connections, you do have a choice. The widest choice will be with dialup connections.
When it comes to ISPs, you have two broad choices. You can choose a local/regional provider, or you can choose a large national company. If you plan on moving, a national provider is convenient as you will not have to change your email address. Aside from that, the main considerations should be the ones I mention below.

How do you find ISPs that serve your area? First, if your local telephone company offers DSL, they may know which ISPs in your area offer Internet access using those services. If the customer service person at the phone company has no clue about ISPs (not uncommon), try their Web site.

Second, talk to people who already have Internet access. This is a good way to find out the names of some ISPs, and at the same time get an opinion as to the quality of the service.

Third, use the Web. There are a number of Web sites that maintain directories of ISPs organized by area code. In my experience, it is a good idea to check more than one directory, because none of them is complete. (If you don’t have Web access, ask a friend who is already on the Net to find the information for you. Alternatively, many public libraries have computers with an Internet connection that can be used for free.)

Choosing an ISP

How do you evaluate an ISP? There are two ways. First, ask people in your area what ISP they use and what they think of the service. Asking around in this way is important, as it will allow you to avoid those ISPs that are not providing good service. Second, do a bit of research. Call each ISP and inquire about their services. If you have Web access (say, at work or at school), check their Web sites. As you do your research, consider the following:

**Price:** Make sure you get a flat monthly rate, not an hourly rate. (You will use the Net more than you think.) If you have a dialup connection, you will probably want a second telephone line, so you can talk on the phone while you are using the Net. Be sure to consider the price of this line when you figure your overall costs. However, when you compare prices, don’t worry about small differences in the monthly fee. Go for the fastest connection you can afford.

**Mail:** Are you going to share your Internet connection (say, with your family, your spouse or a roommate)? Some ISPs will give you several different mail addresses with a single Internet account. Mail works better
when each person has his or her own email address. This is especially true for husbands and wives. Even if you are the only person using an account, it can be handy to have more than one address. For example, if you run your own business, you can use one email address for business and another address for personal correspondence.

Usenet news: Does the ISP offer Usenet news service? If so, make sure they use filters to reduce the spam (junk advertising). This will make your Usenet experience a lot more pleasant.

Technical support: The profit margins in the ISP industry are small, and it is unrealistic to expect a lot of technical support. For example, no ISP can afford to spend time teaching you how to design your own Web page, or even how to use the Web. What you can expect is enough help to get started. If you can’t figure out how to make your connection work, an ISP should help you until it works. Moreover, if you need special software to get connected, an ISP should provide it. At the very least, there should be a telephone number you can call for assistance. (Be prepared, however, to wait a long time.) When you investigate an ISP, see if they provide support on their Web site. Once you are connected, such support can be a great help.

The points we have covered so far are important, no matter how you connect to the Net. However, if you are going to use a dialup connection, there are a few extra considerations:

Local phone number: If you use a dial-up connection, your modem is going to have to dial the phone number of the ISP each time you want to connect to the Net. To keep your costs down, make sure that you choose an ISP you can access with a local phone call.

The larger ISPs have local numbers for various parts of the country. Each of these access points is called a POP (Point of Presence). So in nerd language, we can say that you should look for an ISP that has a POP in your area.

Adequate phone lines: Among people who use a dial-up connection, one of the biggest complaints about ISPs is that many of them do not have enough phone lines. When you use such an ISP, you will spend a lot of time being frustrated because you can’t get through. This is especially true during times of peak usage (evenings and weekends).

Fortunately, checking if an ISP has an adequate number of lines is easy. Find out the local access number, the one your modem would call to
connect you to the Net. (This number will be different from the cus-
tomer service number.) Then use the phone yourself to call the number
and see what happens. Call the local access number at various times on
different days. If you get through each time, that is a good sign. If you get
a busy signal a lot of the time, you have found an ISP to avoid.

Internet Resources   Lists of ISPs (Internet Service Providers)
http://www.ispfinder.com/
http://thelist.internet.com/
http://www.cnet.com/internet/
http://www.herbison.com/herbison/iap_meta_list.html

Does It Matter if Your Dialup ISP Has
Lots of POPs?
If you travel with a notebook computer, you will want to be able to use
the Net wherever you are. For example, it's handy to be able to check
your mail. At home, you dial a local number to connect to your ISP, so
there is no long distance charge. When you are traveling, however, you
would have to pay extra for a phone call to your ISP at home.

All the large, national ISPs have local access numbers (POPs) all over
the country, so if you use such an ISP, there will probably be a local num-
ber for you to dial when you travel. "Wow," you say, "I can check my mail
wherever I go and not have to pay for a long distance call."

But wait — does it really cost that much to call long distance for a few
minutes? Compared to your other travel costs, calling long distance to
check your mail isn't expensive at all. For some reason, it seems cool to
dial a local number when you travel, but realistically, it's just as easy, and
not that expensive, to dial anywhere in the country. Here is a real-life
example that illustrates what I mean.

Jack and Jill both work for the same large company. Occasionally, the
company sends them on a business trip, and when they travel, they each
take a notebook computer to check their email so they can stay in touch
with the home office. Recently, Jack and Jill both went to New York.
During the trip, their expenses were pretty much the same. Both Jack
and Jill flew on the same airline, ate at the same restaurants, and stayed
at the same hotel (in separate rooms, of course; this is a family book).
However, there was one difference. Jack has a dialup account with a national ISP, so while he was in New York, he was able to access the Net via a local phone number. Jill uses a local ISP, so every time she wanted to check her mail, she had to pay for a long distance telephone call.

At the end of the trip, both Jack and Jill added up all their expenses. Jack’s trip cost $1241. Jill had to pay the long distance bill, so her trip cost more: $1256 (but that also included $5 for a chocolate bar she bought at the New York airport on her way home).

The moral of the story? When you travel, if all you do on the Net is check your mail, choose the ISP you want, because saving a few bucks on long distance charges won’t make much of a difference. (However, you may want to bring your own snacks. Chocolate can be expensive at the New York airport.)

**What About AOL?**

AOL is, by far, the largest ISP in the world, and they offer something that the other ISPs do not have: extra services just for AOL users. One of the most popular services are the many chat rooms, where people gather to talk 24 hours a day. In addition, AOL offers many types of information as well as regular presentations. For example, there are events where famous people answer questions and talk to a live audience (by typing, of course, not voice). Overall, AOL tries to maintain the feeling of a large community, a feeling that many of their users share.

However, to access the Internet, you can use any ISP you want, and there are a number of good reasons why you should avoid AOL. First, they have a huge number of customers, and they have real trouble keeping up with the demand. AOL users often have trouble connecting over phone lines at peak periods (evenings and weekends). Moreover, AOL can be slow. Accessing the Web through another ISP is often a faster, more enjoyable experience.

Second, in general, the Internet is free and uncensored. People can do whatever they want. AOL is a private environment. Although there is a lot of freedom, there is definitely Someone-in-Charge. This may or may not bother you.

Third, AOL does not offer anything important that is not available elsewhere on the Internet. (However, AOL does make their services especially easy to use.)
Finally, AOL is not primarily an Internet service provider. AOL is a marketing company that sells Internet access in order to attract customers. The distinction is an important one. AOL makes the bulk of their money from advertising revenues, by selling merchandise to their customers, and by making sales deals with other companies.

My recommendation is to forget AOL, get yourself a regular ISP, and enjoy the Net. However, I do recognize that many people want the special AOL features, so if you think you would enjoy being an AOL customer, I have a suggestion.

You do not have to use them as an ISP in order to be a customer. For a smaller monthly fee, AOL allows you to connect to their services through any ISP. Of course, you still have to pay that ISP, so overall it costs you a little more, but you will be getting the best of both worlds: faster and better Internet service, and full access to everything at AOL.

The Summary Once Again
At the very beginning of this chapter, I showed you a summary of what you were going to learn. We have covered a lot of ground since then, and I want you to appreciate how much you’ve learned, so take a moment and read the summary one more time. By now, you should understand it all.

Harley Hahn’s Quick Guide to What You Need to Use the Internet
Buy a computer running Windows XP, with at least 128 MB of RAM (more if possible). The computer should have a fast processor, a V.90 56K modem, speakers, a microphone, a CD-RW and a built-in Ethernet port. Don’t buy a Macintosh unless you are a professional graphics designer.

For software, if you want a word processor, get Microsoft Word. For everything else, wait until you see what software comes with the computer and what you can find for free on the Net. You don’t need to buy an antivirus program right away.

Get the fastest Internet connection you can afford, either DSL or cable. Do not use a regular dialup (modem) connection unless DSL and cable are not available in your area. Choose an ISP that gives you a flat rate with reasonable customer service. Don’t use AOL unless you know for sure that you want the extra content.