The Uncompromised Mac Desktop Reference demystified

The one source that reveals the hows and whys of Macintosh computing.

by sandy clark

with TOM BADGETT and COREY SANDLER
This book is dedicated to
John J. Johnson, III
1955 - 1990
ACKNOWLEDGMENTS

The three names on the cover of this book perch atop a pyramid envisioned, designed, and built by a talented cast of professionals in computing, publishing, and printing.

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Introduction

So where do you start?

So you own a Macintosh, are buying a Macintosh, or are forced to deal with one somewhere in your professional life. This book is intended to explain the Mac for you and make it more accessible. If you already know your Mac well, you should find details and resources here that you have overlooked. If you are new to the Mac or new to computing, we won't skip you. This book is intended to be a light on the dark and mysterious corners of your computer. We'll show you everything from your Mac's secret inner workings to where to shop.

This book has four general divisions. First, Chapters 1 and 2 are for the incoming Mac users, whether you are simply buying a system or are already terrified of the one you own. Chapters 3 through 6 are a boot-camp of sorts. You will be much more familiar with the intricacies of your Mac when you finish these chapters. The advanced topics and skills of the Mac world are covered in Chapters 7 through 14. You'll be approaching guru or alpha-geek status around the office when you are done with these. From Chapter 15 on, you will earn your Mac citizenship by learning about the breadth of your Mac's versatility. We'll even show you were to find more Mac info and add new tools to your Mac.

What does it all mean?

We have used a few conventions to make this book more understandable. First, whenever a new term is introduced, we have italicized it and placed it in the glossary. For example, if we were to discuss connecting your Mac to a T.A.R.D.I.S., then we would also include an entry in the glossary. Of course we will also tell you it stands for *time and relative dimensions in space* in the body of the text so you aren't completely in the dark.

Occasionally, we need to tell you to press some keys on your keyboard. We've tried to make that as painless as possible by showing you such keystrokes as ⌘ + right in the line of text.
You will encounter the occasional sidebar throughout this book. There are four flavors.

- **More** - More sidebars tell you added information about the topic at hand.
- **Mac OS** - Mac OS notes reveal System Software differences.
- **Hand** - Warnings are there to tell you about potential trouble.
- **Mac PC** - Cross-platform notes point out relevant PC-related information.
- **Scissors** - Shortcuts are generally quicker ways of working.
- **Water** - Author’s notes are generally our chance to ramble on about anything we like.

**So where exactly do I go?**

For those with little Mac or computer experience, there is Chapter 1 - Meet the Mac. This chapter will get you up to speed and put you at ease with your machine right from the start. This is also the place to begin if you fear your Mac. Computer anxiety is really a function of familiarity or too many viewings of *2001: A Space Odyssey*. The more you understand your Mac, the less intimidated you will be.

If you are looking to buy a Mac, Chapters 2 and 23 will help you make a choice. Chapter 2 weighs some of your options, and Chapter 23 collects many Mac resources into one place for you. You’ll find everything from magazines to Usenet newsgroups. These chapters should help dispel that persistent “There is no variety in the Mac world” rumor.

The worst sometimes happens, and this book contains three chapters written specifically to make your worst computer experiences survivable and to help you prevent as many bad experiences as possible. If you are currently suffering from a skittish Mac, Chapter 6 - Troubleshooting will help you narrow your problems down. Chapter 13 - Preventive Maintenance should keep new troubles at bay. Finally, when disaster does strike, recover quickly with the information in Chapter 14.
meet the mac

IF YOU'VE NEVER MET A MACINTOSH BEFORE, THAT FIRST encounter can be confusing. This chapter is intended to ease your fears. Even the Mac itself tries to make the experience as friendly as possible right from the start, as you can see in Figure 1-1. Seeing that familiar face on your startup page seems appropriate. You may be afraid of all computers. You may be more familiar with UNIX, DOS, or Windows. You may simply be unfamiliar with your Mac. All we assume in this chapter is that you have just encountered your first Macintosh. Maybe you inherited the machine from a relative or were thrust into the encounter

Figure 1-1: Friendly Mac Setup
at work. This quick tour will let you know what kind of a machine the Macintosh is and hint at what you can do with it.

What can you do with a Macintosh? Well, Macs are the most abundant machines in the desktop publishing, graphics, multimedia publishing, web page design, and educational markets. Every major PC business application has a Mac counterpart, and there isn't anything you can't do. You can even run Windows 95 with the addition of the right software.

The first section, Mac Origins, gives you a brief history of the Macintosh. Mac Basics covers the hardware side of what a Mac is and discusses such terms as RAM and serial port that you will need later in the book. Finally, Mac Specifics covers the most basic skills for using your Mac and finding help.

**Mac Origins**

Before we even tell you how to turn on a Mac, we'll look at the origins and current status of the Mac. You need to know just a little about where it came from if you hope to understand where it is today.

The Macintosh is a desktop, or personal class, *computer*. There are two main types of desktop computers, *PC compatibles* and the Macintosh. These groups are referred to as *platforms*. PC compatibles are different from Macs in several ways we will discuss. Basically these are the Windows machines you see in abundance just about everywhere.

Historically the PC compatibles have always been more abundant since their introduction in the early '80s. Before they came along, the most popular personal computer was the Apple II, which was created by Steve Wozniak and Steve Jobs. Jobs was never satisfied with either the Apple II or the other computers on the market at the time.

When Steve Jobs joined the Macintosh development team at Apple Computer way back in 1980, his goal was to change the way everyone
saw the computer and change the world. What he wanted was a machine that was so friendly and easy to use that artists, poets, teachers, and normal people would flock to it. The Macintosh

Before we go too far, we ought to address that one great misconception about the Macintosh and the question so often raised by the uninformed, "I thought the Mac was dead?"

Mark Twain would probably reply, "The reports of Apple's death have been greatly exaggerated." You've heard the stories of how the Mac has no software, no market share, and nobody uses them to do real work. Well folks, that is, in a word, hogwash!

So how big a slice of the computer pie is made up of Mac OS machines? The fact is, the Mac community is 25 million+ machines strong and getting bigger every year. Macs also tend to have longer useful lives, so you have more older machines still in the work force. It isn't unusual to find seven- and eight-year-old Macs still doing useful work in homes and offices around the world.

The platform itself is a strong performer for software developers as well. Adobe and Dantz software reported stronger-than-expected growth in 1997 because of their Mac-software sales. Adobe reported a 42 percent increase in Mac sales for the third quarter of 1997. MacSoft, which produced the Mac versions of the Duke Nukem 3D and Civilization II games, also reported surprisingly strong sales. In fact, it reported a profit on Duke Nukem 3D for Mac on the first day of sales, and Civ II is performing even better.

Macs are the most frequently encountered machines in several key industries as well. Macs dominate graphics, desktop publishing, web publishing, and education. In magazines such as NewMedia and Desktop Publishers, high-end Macs are routinely compared with Windows NT, SGI, and DEC Alpha workstations. The verdict: Macs have more software options and a better price-performance ratio in multimedia and publishing than these other platforms.

Mac users also report higher satisfaction than Windows users, and dual-platform users report higher productivity and higher creativity on their Macs. Don't take our word for it, see what several thousand other Mac and Windows users have to say at www2.apple.com/whymac/brochure/why.html. Many colleges, including Vassar, Stanford, and Dartmouth still recommend Macs.
team had been focused on building a highly portable, affordable, and compact computer under the direction of Jef Raskin before Jobs arrived.

Apple was on the verge of striking out. The Apple III had been a failure, and the Lisa, which Jobs had been working on, was considered too high-priced to make a reasonable business machine. Jobs looked around for a project where he could create the affordable and easy-to-use machine he envisioned.

Jobs wanted something he had seen on a tour of Xerox's research-and-development labs at Xerox PARC in Palo Alto. He wanted a graphic user interface, or GUI. This means you click on commands instead of typing them. Since he had already ironed out the bugs on his concepts with the Lisa, it was just a matter of making them work on the cheaper Mac 128 shown in Figure 1-2.

![Figure 1-2: Mac 128](image)
At the time the PC compatible was rapidly becoming the dominant computer platform. Like the Apple II that Jobs had helped to create, it was an intimidating machine to operate. The black screen in Figure 1-3 seemed to scowl at the user. Simple tasks like copying a file required lengthy commands to complete. It seemed the computer would never

![Figure 1-3: Black Screen of DOS Machine](image)

become the universal tool Jobs envisioned.

With Macintosh he set out to put a dent in the universe and he did, although not quite in the way he wanted. Today every PC-compatible machine, not just the Macintosh, looks and acts like the Macintosh did when it was released in 1984. They all make use of a graphic user interface. Every computer is easier to use now, and millions more people are using them. That doesn't change the fact that the Mac is a computer. It is just a computer so easy to use that it changed the world.
Mac Basics

A computer isn't a typewriter, but you can use it like one. It isn't a drafting table, but it can mimic one in a pinch. It isn't a movie studio, but with the right hardware, it can pretend to be. A computer is simply a tool for communicating. Whether you process video, words, or pictures is up to you. Whether you print it on paper, create a CD, or email your information to someone else is up to you as well. The Macintosh lets you do all of these things.

Computers generally have two major components: hardware and software. Hardware is all of that stuff you can see and touch. Software is a collection of instructions that tell the computer what to do. Everything from what is displayed on the monitor to what gets printed is controlled from software.

The Macintosh’s heart and soul rest in a box called the CPU. This box gets its name from a chip called the central processing unit on a circuit board inside the case. Strictly speaking the CPU is only the processing chip, not the case and all the other stuff in it, but popular usage reigns. CPU means the chip and all the stuff inside the main case besides. Generally, everything else is tied into this box. Take a look at the Mac Centris in Figure 1-4. The monitor sits on the CPU. You are probably familiar with the keyboard and mouse already. On your machine at home, look for the box with wires coming out and you’ve got it. All roads lead to Rome and all cables make a beeline for the CPU. Inside this box are the drives, power supply, RAM, and the motherboard, along with any cards you may have installed.

In the early days of Macintosh, this CPU was made to be carried as a single unit and even contained the monitor. It had a built-in handle and weighed less than 15 pounds. The idea was that anyone could move, setup, and use this computer. In fact, at one time Jobs wanted to call the Mac “The Bicycle” for its portability. The original design even called
for a built-in printer! One of the many slogans from these early days was, "Never trust a computer you can’t lift."

Inside your CPU lies the major difference between a Macintosh and that other popular computer platform, the IBM PC compatible. The central processing unit, that’s the chip inside the CPU, is completely different on different platforms. On PC compatibles the CPU is manufactured by Intel and called the *Pentium processor*. On the Macintosh the CPU is manufactured by Motorola and called the PowerPC.

Though there are other differences between the “Wintel” machines and the Macintosh, the processor is the main one. Software written for one CPU as a rule will not run on the other. It has been this way since the Macintosh was born. Earlier Macs ran on Motorola’s 68000, 68020, 68030, and 68040 chips while earlier PC compatibles ran on the Intel 8088, 80286, 80386, and 80486 chips.
Riding on top of the hardware is the most important software your computer will ever know. This is the operating system, sometimes called the OS, including Apple’s recently released OS 8 shown in Figure 1-5. In the Macintosh world, the platform (hardware) and the OS (software) are almost synonymous. This is because the Mac has been running a single operating system since its birth in 1984. Depending on the version number, this is simply called the System or System 7, System 7.6, System 8, etc. System 8 or Mac OS 8 is the most recent operating system on the Mac, and it is a direct descendent of that first System that shipped with the Macintosh 128.
Compare this to the PC-compatible world and you’ll see why Windows and Microsoft DOS have such a higher profile. There have been about a dozen different operating systems over the years. You had Microsoft DOS and several competing alternative operating systems in the early days. Microsoft’s dominance was by no means unquestioned. When DOS became the unchallenged standard, Microsoft decided to design a Mac-like OS called Windows. IBM and Microsoft also released OS/2, which IBM later put into direct competition with Windows 3.1. In 1995 Microsoft gave Windows the biggest upgrade of its life with Windows 95. Additionally, you can run several flavors of Linux, a UNIX variant for the PC compatible, or you can run Microsoft’s advanced Windows NT. With all of those competing, conflicting, and exclusive environments, you can see why many Macintosh users run screaming at the thought of using a PC compatible.

Apple Computer once built every Macintosh computer on Earth. In the last two years the Macintosh clone has become part of the Macintosh world. Starting in 1994 Apple licensed the architecture and System software to other computer makers. These clones are every bit as good as the machines made by Apple, and Apple has felt that in its hardware sales. Though more Macintosh systems were sold in 1997 than ever before, Apple’s share of those sales shrank noticeably. People were simply buying Mac clones instead of Apple’s products. It looks like that is about to change.

In the fall of 1997 Steve Jobs found himself at Apple’s helm again as interim CEO. A long-standing feud between Microsoft and Apple was settled, Oracle CEO Larry Ellison joined Apple’s board of directors, and the Newton products division of Apple has been spun off and then drawn back into Apple all in a matter of months. Perhaps most surprising, Jobs effectively killed the Macintosh-licensing program and purchased the Macintosh side of flagship clone-maker Power Computing.

Look for the number of Mac clones on the market to dwindle, and don’t look for any new designs. Apple is keeping more-advanced sys-
tems based on the new PowerPC 750 chips to itself. This kills any hope of ever seeing machines such as the StarMax 6000 shown in Figure 1-6. Motorola and other manufacturers already had these advanced machines in early production when the ax fell. Ads for them even ran in the pages of MacWEEK, but you'll never actually see one on the shelves. This doesn't mean the clones that are out there are obsolete, though. They are still Macs and will work as well as Apple's own machines of the same vintage. With a Mac's longevity, expect to see Mac clones chugging along in homes and offices for at least another decade.

When you go looking for Macintosh software, you might have to look a little harder than with Windows software. That doesn't mean that software isn't out there. According to Apple's website, over 2,400 Power Macintosh applications have shipped. Of course, there are over 10,000 non-PowerPC applications that will run on your Mac without getting the speed boost of your PowerPC processor. Why are there so many more programs for the PC down at Babbages? Like some of the non-PowerPC Mac software, lots of those programs are for the older Windows 3.1 or DOS systems, which in their day outnumbered the Mac as well. They'll
Do you need a PC to be compatible in a PC-dominated world?

There are several arguments that say you have to have a PC today to get anything done, but that just isn't true. In fact, if you want to use both platforms, then a Macintosh is the only way to go. Macs can read both PC and Mac disks with ease, and there is plenty of software out there in every field or discipline you can imagine. If you use a particular program at work, then there is probably a Mac program that can use the very same data in your Mac at home. Graphics, word processing, database, and spreadsheet information can be saved in portable interchange formats to move between platforms. Other cross-platform technologies such as the Internet are making your platform choice irrelevant as well.

You can even run PC programs right on your Mac with one of several PC emulators on the market today. The Screen shown in Figure 1-7 is from Insignia Solutions Real PC. For around $80 you can emulate a PC on your Mac. Emulation means Real PC pretends to be a PC and translates everything it sees for your Mac. You can run DOS games and struggle with your autoexec.bat and config.sys files just like a PC user. Additionally, you can even up-grade to Windows 95 if you like. Insignia also sells products from SoftWindow that come with Windows 3.1 or Windows 95. In addition to Insignia's products, Connectix has a very similar package called Virtual PC that does the same thing.
The drawback to an emulator is the speed. Since it has to do everything a PC's Pentium chip would normally do in slower software, it can be very slow. Don't be surprised if your Mac performs like a PC only half as fast in emulation. It simply takes a lot of horsepower to fake another platform. Luckily, there are even faster options.

Apple has offered several PC-compatible systems over the last few years. These machines sport both PowerPC and Pentium processors inside the same case. You can run both platforms and share the monitor and keyboard. You can even cut and paste information between applications in both environments. It's the best of both worlds. In addition, third-party options exist. Orange Micro makes several models of card-based PC for your Mac. You can add a Pentium processor to any Mac and get the benefit of total compatibility and hardware speed. See Orange Micro's website in Figure 1-8 at www.orangemicro.inter.net.

You can also run other operating systems on your Mac. There are emulators for machines ranging from the old Atari 8-bits to the Digital Equipment Corporation VAX. Finally, you can run a native PowerPC version of Linux or BeOS if you want. You don't get the Macintosh software advantages when you run these other operating systems, but if you are looking for macho water-cooler techno talk, then this just might be your ticket!
still run on Windows 95, but they don’t take advantage of any of its advances.

Why doesn’t the Mac at least get more shelf space? With thousands of programs out there, they could fill at least a couple of aisles. Retail outlets have higher PC software sales so they dedicate more shelf space to the PC. It is simply supply and demand. That isn’t going to change anytime soon, and it doesn’t mean that there isn’t any Mac software available. See Chapter 23 for tips on finding more Macintosh software and information.

Most Macintosh software and hardware is sold through mail order for just this reason. You can find anything you might be looking for in the pages of a catalog or magazine, or online. Another place to look is in the Windows sections of those very same retail outlets that don’t carry Mac software. Many times software companies, particularly game and utility producers will write hybrid CD-ROMs that have both Mac and Windows versions of the program on the same disk. These usually get shelved with the Windows software. A good example is the You Don’t Know Jack: Movies CD from Berkeley Software shown in Figure 1-9. Read those packages carefully, and check out http://users.cybercity.dk/~dko10781/ms/hybrid-cd.html. They have over 300 hybrid CD-ROMs listed along with links to the manufacturers.

The Macintosh System software controls everything your computer does from playing a CD to running other programs. Over the years it has become more and more powerful. As abilities have been added, the amount of memory, or RAM, and storage, or hard drive, space has increased. The next section covers these and many other terms you’ll need to know to make use of the rest of the information in this book.

# Hardware

If you are totally new to computing, terms such as memory, RAM, storage, and hard drive can cause some confusion as well. Your storage
and memory are both measured in megabytes, or megs. Generally, you'll have hundreds if not thousands of megs of storage and only a few megs of RAM. Storage usually costs several cents per meg and RAM costs several dollars per meg. If you hear the term gigabyte or gig then someone is discussing 1,000 megabytes of something. You can be pretty sure they aren't talking about RAM at today's prices!

The RAM (random access memory) is used by the microprocessor to store live data. When the machine wants to remember or store a piece of information, it writes it out to the hard drive. Additionally, you have CD-ROMs, which you can read from but never write to. You have a wealth of other storage formats from Zip disks to floppy disks to DAT tapes.
You can plug these extra drives into your Mac, or you may have them mounted internally. You can also add a modem for communicating with the outside world, plug into a *network* with the Mac's built-in networking, or add any of hundreds of other devices to your Mac, like the Apple scanner in Figure 1-10. These extra devices are called peripherals. They plug into the ports on the back of the Mac.

*Figure 1-10: Apple Scanner*

The back panel of an LC III in Figure 1-11 can show you all of the most common *ports* and connectors on any Macintosh CPU. These ports are the way your Mac communicates with the outside world. Sound, video, data, and power all pass through the back of your Mac. Starting at the left, you have the power switch and plug for the electrical cable. Mac power switches are universally labeled in binary with 1 and 0. The number 1 means on and the numeral 0 means off. The power plug is labeled with the 齑 icon. Every port on the back of your Mac has its own symbol. Usually you'll find that same symbol on your cables as well, making it easy to figure out what's what.
The next port to the right is for your monitor and is identified by the \( \square \) icon. The technical name for this connector is a DB15M. The M means male and you plug the male plug into the female connector. You can plug any Apple monitor directly into this port. It would be nice if every Mac and monitor used this port, but alas, it isn’t so. Some Power Macs have slightly different HDI45 connectors instead. These ports are larger than the normal DB15 port and the connectors click into place when you plug them in. On Powerbooks, you may even encounter an HDI14 port. This is a very tiny, thin video-out port for portables. For other monitors like the ones sold for PCs, you need a Mac-to-VGA adapter. With this adapter, you can use just about any monitor with your Mac. Look for cables and connectors like these and the others discussed here from any of the catalogs or resellers discussed in Chapter 23.

The next two ports are *serial* ports. On most Macs you will have to have two of them, labeled with the \( \mathcal{G} \) icon. The connectors that plug into these ports are technically called DIN8 connectors. In addition to connecting your modem or printer here, you can plug into an AppleTalk network with a PhoneNet or LocalTalk cable and add other peripherals as well. For example, the popular Pilot handheld computer uses one of these ports to sync itself with your Mac, and the QuickTake camera uses a serial port to talk to your Mac as well.

The *SCSI* port is up next. It is identified by the \( \mathcal{G} \) icon. You connect devices such as scanners and hard drives to this port. SCSI stands for Small Computer System Interface and is discussed in detail in Chapter 12—Drives and SCSI Voodoo. Your Mac will typically use a DB25
connector like the one above. These are the same SCSI connectors you'll find on Iomega's Zip drive, but some Powerbooks and the Duo Docks use the smaller HDI-30 port. It can get more confusing since there are also SCSI C50, Mini D50, and Mini D68 connectors out there as well. Before you purchase any SCSI device, make sure the cables you are getting will actually connect it to your Mac. If not, you may need to purchase an additional cable or adapter.

Your keyboard and mouse talk to the Mac through the ADB port identified by the icon. ADB stands for Apple Desktop Bus and on some Macs you may find more than one. You can connect joysticks and drawing slates through this port as well. ADB devices can be chained together. On Macs with only a single ADB port, you generally plug the mouse into the keyboard and the keyboard into the Mac.

Your Mac's audio ports are up next. You'll have an audio-in and an audio-out port labeled with the icon and icons, respectively. These ports are for stereo miniplug connectors. You can purchase the adapters to wire your Mac into your home stereo if you like or attach

*Figure 1-12: Mac External Speakers*
any number of external speakers like the ones in Figure 1-12. The microphone input on your Mac requires a special microphone from Apple or an externally powered microphone. Apple's microphone has an extra-long stereo miniplug that draws its power from your Mac's internal circuitry. Learn more about audio in Chapter 20 - Multimedia, Movies, and Sound.

The two most prominent peripherals are your mouse and keyboard. You control the computer with these two devices. The mouse is used to point, click, and drag your way through your work, and the keyboard is used to generate text inside the computer. These two devices are standard now, but when the Mac first came out, the mouse shown in Figure 1-13 was a very rare peripheral. The Mac was one of the first computers to make real use of it. Instead of the mouse, you may have a trackball or trackpad with your Mac. This is definitely true if you are using a Powerbook or Macintosh portable.

Figure 1-13: Early Mac Mouse
Your monitor will determine a lot about your computing experience. The more colors you can display on the screen, the better your graphics, pictures, web pages, and video games will look. This is measured by something called bit depth. Usually this is dependent on the amount of special video RAM or VRAM, you have. On some Mac models this is directly on the motherboard. On other models you may have a separate video card or you could even be using the Mac's regular RAM as VRAM.

Macs generally run at the following bit depths:

<table>
<thead>
<tr>
<th>Bit Depth</th>
<th>Colors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 bit</td>
<td>2 colors</td>
</tr>
<tr>
<td>4 bit</td>
<td>16 colors</td>
</tr>
<tr>
<td>8 bit</td>
<td>256 colors</td>
</tr>
<tr>
<td>16 bit</td>
<td>32,768 colors</td>
</tr>
<tr>
<td>24 bit</td>
<td>16,777,216 colors</td>
</tr>
</tbody>
</table>

The 1-bit Macs are the early ones, but it is possible to run other Macs in black-and-white as well. Most of your early color Macs were 4- or 8-bit machines. Of course, who wants to remember the exact number of colors at 16 and 24 bits? If you look at your monitor's control panel, you will notice that it lists much more user-friendly options of thousands and millions of colors for those bit depths.

You may have a Mac with a built-in monitor. In these models, the CPU and monitor are in a single case like the one in Figure 1-14. The earliest Macs had built-in black-and-white monitors, and Apple has always kept a few all-in-one machines around. They tend to be very portable and popular with schools and students living in dorm rooms.
Mac Specifics

If you already know how to find help on your Mac, use the mouse, select files, and open menus, then you may want to skip this section. If you need more on the basics of getting around and finding help on your Mac, then read on. We'll cover turning your Mac on and off, using the mouse, and finding help.

On and Off

Starting your Mac is easy, you just press the button on your keyboard or flip the power switch in back. When you do, you start something called the startup process. This is where your Mac loads all of the
software it needs to be a Mac. See Chapter 4—The System Folder and Startup for more on this process.

Shutting down your Mac is just as easy but requires one very important additional step. Before you turn off your Mac, you need to shut it down. Specifically, you need to choose Shut Down from the Special menu. This starts your Mac's shut down procedure. Your Mac takes this time to make sure all of your applications have saved their work and closed properly before you kill the power. When it is done, your Mac will display a message that reads “It is now safe to switch off your Macintosh,” or it just shuts off, depending on the model. You can also shut down your Mac by pressing the $ key on your keyboard or selecting the Shutdown item in the Apple Menu on some models.

**Mousing Around**

The first thing you need to master to use the Macintosh is your mouse. The Mac mouse has one button and is connected to the CPU through the ADB port. When you move the mouse, you create a corresponding movement in the on-screen pointer shown in Figure 1-15. If you move the mouse right, the pointer moves to the right on the screen. If you move left, the pointer moves left.

![Figure 1-15: Mac Mouse Screen Pointer](image)

To select something, you move the pointer over it with the mouse and tap the mouse button. This action is called a *click*. You can open menus or select files and other *icons* with a mouse click. Icons are the little pictures like the ones in Figure 1-16 that represent just about
everything on your Mac. You can also click on buttons to select them. Closely related to the click is the double-click. As you might guess, a double-click is two clicks. You just do them very quickly. This skill is harder than it looks for some folk. Don’t be surprised if you have trouble. Lots of people move the mouse between clicks or don’t click fast enough for the Mac to recognize a double-click. It is an acquired skill that will be second nature before you know it. For some new users it is easier to learn the double-click technique if they think of the rhythm in music terms. A single-click is a quarter note whereas the double-click is two eighth notes.

If you have used a Windows machine before, then you may wonder what happened to the other buttons. You don’t need them. Anything you can get to with a right-click on a PC, you can do by using a keyboard shortcut on the Mac. Keyboard shortcuts are a combination of two or more keys that your Mac sees as its cue to make your life easier. For example, in most applications the key combination \(\text{ Alt + Option}\) will quit the application for you. Just press the \(\text{ Alt}\) and \(\text{ Option}\) keys at the same time. You can see several keyboard shortcuts in your Mac’s menus.

Other key combinations work with the mouse in Mac OS 8. For example, you can duplicate a file by holding down the \(\text{Option}\) key while dragging it. If you hold down the \(\text{Alt + Option}\) keys when you drag an item, you will automatically create an alias. Aliases are discussed further in Chapter 3. Holding down the \(\text{Control}\) key when you click on an item will bring up the contextual menu shown in Figure 1-17. Contextual menus act as shortcuts to relevant menu items for the file you have selected.
If you move your pointer up to the *menu bar* at the top of your Mac's screen, as shown in Figure 1-18, you can open any menu with a click. Menus like the one in Figure 1-19 reveal a number of keyboard shortcuts next to their commands. The commands are called *menu items*. On versions of the Mac OS before OS 8, you had to hold down the mouse button to keep a menu open. Now they stay open when you click on them. To select a menu item, either type the keyboard shortcut or click on it with the mouse.

One final operation you should know is the *drag*. To drag something on your Mac, just select it with the pointer and keep holding down the...
mouse button while you move the mouse. You can now drag the cor-
responding file anywhere you want. In Chapter 3 - Finder and Menus,
you'll learn how to use your mouse to copy files just by dragging them.

![Typical Menu With Keyboard Shortcuts](image)

**Figure 1-19: Typical Menu With Keyboard Shortcuts**

**HELP!**

You have three basic forms of help available to you on the Mac. The first is your intuition. Once you learn how things work on your Mac, you can usually guess how they will work in most new programs you encounter. The on-screen controls all work the same from application to applica-

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24 | the uncompromised mac desktop reference
tion. Keyboard shortcuts are mostly the same from application to application, and generally you can't break your Mac by trying things. If you do mess something up in one of your applications, the keyboard shortcut `⌘ + Z` will generally undo your goof for you.

Second and much more useful to the beginner is balloon help found under the Help menu in the Finder and most applications.

To activate it just select the Show Balloons menu item in the Help menu as shown in Figure 1-20. Now, helpful information sprouts out of anything you place the pointer on as in Figure 1-21. Not all applications have balloon help programmed into them, so the actual usefulness of this feature will vary from program to program.

The final and most useful help feature is Apple Guide. You'll find it under the help menu as the Help menu item. You can generally bring
Apple Guide up with the + keyboard shortcut or the help key on the extended keyboard. You can view the available help by Topic or Index, or you can perform a search with the Look For button as shown in Figure 1-22. When you select a topic, Apple Guide will walk you through it, step by step if necessary. It will even go into more detail if you don't understand right away.

Just look at this Apple Guide for using the Mac's built-in speech technology to your Mac read text aloud in Figure 1-23. It tells you what
to do step by step. In this example, it asks you to open SimpleText. If that request baffles you, then clicking on the Huh? button in the lower-left corner will provide you even more help. In this case, it starts you down the help for “How do I find an item?” shown in Figure 1-24.

![Figure 1-24: “How Do I Find an Item?” Help Display](image)

With that brief introduction, you are ready to set out and explore. Using the help resources above and this book, you should be able to learn to do just about anything. The entire universe of computing awaits you and your trusty Macintosh. Go forth, compute, conquer and change the world. That’s what the Mac was built for!
WHAT DO I BUY? WHETHER YOU WANT TO UPGRADE FROM an aging Macintosh Centris or buy a new machine for home, this is the question that will preoccupy your mind. Basing your choices on the two Macs being sold at your local electronics or computer store can be a gloomy proposition. Luckily, there are many more options than what your local chain stores offer. We'll look at some of those options in this chapter along with strategies and tips to help you determine exactly what you need. Don't start thinking it will be a cakewalk based on the limited number of Macs you've seen in the stores. There are more Mac choices in the catalogs, magazines, and websites than you have probably even thought of.

Are you going to want to buy less machine so you can add more extras like a larger monitor or more memory? How about adding a scanner or camera? When you consider the purchase of a new machine, it is time to think about these extras as well. You'll also need to make an inevitable decision between portability and expandability.

**Buying Options**

So you have decided to buy a Mac or upgrade from an older model. There have never been more Mac options in the market than there are right now. There is more Mac software and more Mac hardware out there than you could have imagined just five years ago. If you measure the vitality of a platform based on the variety and abundance of products produced for it, then the Mac is in great shape. If you measure plat-
form vitality based on retail availability at your local mall or computer superstore, then you might think the Mac was dead.

The fact is that retail outlets just don't do a very good job of keeping Mac hardware and software on the shelves. This has created a robust and dynamic mail-order trade in everything Mac. You'll find more than a dozen different new machines on the market right now. If you widen your scope to the used and refurbished markets as well, then your choices are staggering.

There are basically three categories of Mac you can purchase: new machines, used machines, and refurbished machines. You probably already know the difference between the first two. New machines come with a full warranty (generally a year or more), sealed in a big, bright retail box, and with that "new car" smell. Used machines are simply experienced systems with a little wear and tear on them. Refurbished machines are the way Apple and the clone-makers clear their returned or defective inventories out. This usually doesn't mean there is anything wrong with the Macs themselves. They are completely functional and serviced at the factory with all original parts and supplies. They generally have a shorter warranty and generic packaging to reduce cost. You can expect to pay the most for a new Mac, considerably less for a refurbished one, and even less for a used one.

You won't see deals like these if you simply haunt the aisles of your local computer stores. To find real Mac selection, you need to look into the classified sections of a few Mac magazines for advertisements, consult the Yellow Pages for a local Mac retailer, check out a few Usenet newsgroups, browse the web, and order a few catalogs. This is actually true for PCs as well. You can find a great deal of diversity and value on any computer if you shop around and don't take your local retailers at face value.

Begin your search for new hardware with your local Apple resellers, especially smaller independent stores, if you have them. The main advantages a local reseller can offer you are advice, service, and support.
after the purchase. They can also direct you to Mac-oriented events and user-group meetings in your area. To find your own Apple reseller, you can call 800-538-9696 or take a look at the buy.apple.com website shown in Figure 2-1 for a list of resellers in your area. Apple also offers connections to Value Added Resellers (VAR) and the Apple Solution Providers Network (ASPN). These two resources can help you put together a more complete solution for your small business. VARs can customize a machine for your specific needs. They can add equipment and create just the combination of processor, RAM, and software you want. Members of ASPN can go a step further and build entire office solutions for you. They can help you design, order, and install an entire
Mac-based network, pre-press shop, or whatever you need. Look for more information on VARs at var.apple.com shown in Figure 2-2. To find ASPN members, look to www.aspn.apple.com shown in Figure 2-3.
Catalogs, like the one in Figure 2-4, can provide you good prices and relatively fast service. Mail order prices can be lower than buying locally, but there are several considerations in making this purchase decision. When you purchase through the mail you will pay shipping and handling fees that can be fairly expensive on a full computer system that includes heavy devices such as monitors and printers. In some states you'll pay sales tax even on mail order purchases. Although waiting on products to ship from a distant company is not as fast as walking into a local store and carrying it home, you can usually get one- or two-day
shipping via Federal Express, United Parcel Service, or Airborne Express. You may pay extra for this, of course, but some companies include two-day shipment as an incentive to purchase.

Then there's the issue of expertise and support. We have found that some mail-order companies provide better buying advice and after-purchase technical support than some local computer stores. We've also seen it go the other way. So as long as you are studying purchase options, look at all aspects of the situation. Make sure you understand what you are getting for your money.

Catalogs will have a great selection, but they usually won't do much in the way of customization for you. Unlike Apple VARs, they aren't in the business of building your exact system. Be sure to ask. They will
sometimes add extra RAM if you purchase it with a system, but generally their commitment stops there. You won't usually find used or refurbished machines in the catalogs. They tend to sell new and new only.

Other smaller mail-order vendors can be found in the pages of the various Mac-oriented magazines. If you aren't familiar with them, see Chapter 23. Toward the back of *Mac Addict*, *MacWEEK*, and other magazines you will find dozens of Macintosh software and hardware dealers as shown in Figure 2-5. Prices will vary wildly in these ads, so shop around. In addition to selling new equipment, many of these resellers will also offer used and refurbished machines as well. For some, like the advertiser in Figure 2-6, used and refurbished units are their primary business. Since these are generally smaller businesses, the amount of service you get will vary widely as well. Many of them may offer to install extra drives and equipment for you and even load any software you purchase along with your new Mac, if you ask. Make sure you read the sidebar on mail-order buying and Internet buying tips in this chapter.

In addition to catalogs and mail-order resources, there is a robust and growing online marketplace on the Internet. You will find Mac hardware on Usenet and on the World Wide Web. Some of the more active
Figure 2-5: Typical MAC Dealer Advertisement

Figure 2-6: Used-and-Refurbished- Mac Ad
groups dealing in Macintosh hardware and software are shown in Figure 2-7. Usenet is a collection of messages posted around the world via the Internet. Usenet is discussed in detail in Chapter 17—Working the Internet. In addition to postings from some of the same advertisers you'll find in the back of *MacWEEK*, thousands of smaller businesses and individuals sell Mac systems there. This is the best place to find a great deal on a used system. You will find more businesses on the World Wide Web. A simple search like the one in Figure 2-8 turns up thou-

![Figure 2-7: Usenet Newsgroups](image)

![Figure 2-8: Sample WWW Search Results](image)
sands of potential resources for the would-be Mac buyer. In addition to the established catalog and mail-order companies we’ve seen, there are several web-only resellers as well, like www.smalldoggy.com shown in Figure 2-9.

![Netscape: Small Dog Electronics Home Page](image)

**Figure 2-9: www.smalldoggy.com Website**

Additionally, you can subscribe to mailing lists sent out by smaller resellers. These individuals may deal in Mac hardware and software or a variety of computers. You will usually find postings from them in the newsgroups from time to time, but to really get the best deals, you need
to get their mailings. In the case of used or one-of-a-kind deals, the early bird gets the worm.

Just picking up the phone and ordering items may seem straightforward, but there are traps and pitfalls if you aren't careful. When ordering anything through the Internet, by phone, or through the mail, the old saying "Buyer Beware" holds doubly true. Here are a few tips:

1. **Credit cards:** Credit cards are just about a standard form of payment for mail-order and similar purchases. They can also offer you some help in resolving disputes with vendors if you don't get the product you ordered or there is other trouble after the sale. If you don't have a credit card, you may have to pay COD charges to get your product overnight. On top of that, COD usually means a trip to the bank for a certified check. It's as if you are penalized for not choosing to carry around high-interest credit card debt! You might see if your bank can offer you a VISA debit card. This card zaps money directly out of your bank account and otherwise behaves exactly like a credit card. Best of all, you are spending cash, living within your means, and will never pay a penny of interest.

2. **Get the details:** Make sure you and the salesperson are both talking about the same thing. Confirm all of the details you can. Model numbers, size, make, model, and version numbers are all important details to get straight. It is very easy to purchase one thing and get another if you are not careful. For example, a *MacConnection* catalog in late 1997 listed eight different models of the Power Macintosh 6500.

3. **Verify items are in stock:** Sometimes the salesperson won't have the item you requested on hand. In a perfect world, you would be informed on the first call. It isn't a perfect world, and calling the reseller back only to find you are on back-order is more common than it should be. Make sure to get a confirmation that the item is available and shipping. If the item is not available, make sure they will not charge your credit card until the item has shipped. If they will not offer this guarantee, you might want to consider another vendor.
4. Write down details: You will be given totals, order numbers, and other information while you are talking with the salesperson. Write it down. Write it down. Write it down. No matter how sure you are things will go OK, that one time you don't write it down, disaster will strike.

5. Confirm warranty information: Confirm that the product you are buying is new and has a full warranty. If you are buying refurbished, then confirm the length of warranty in that case as well. Also ask about technical support and help after the sale and write the details down. In many cases the seller may offer some support in addition to that of the manufacturer.

6. Usenet and shipping COD: Finally, when buying something from an individual over Usenet, everyone has the same problem. How do you trust the person on the other end of the deal? Sellers worry that they'll get a rubber check from the buyer, and the buyer worries that he'll get nothing for his trouble. There are a couple of things you can do to protect yourself. First, always handle sales through a supplier you don't know with COD, or cash on delivery. UPS and other shippers will generally do this for a small additional fee. Since they accept only secured funds, the seller is sure to get his money. The buyer gets the added security of actually having the package in hand before parting with the money. You may also want to check the newsgroups for other posts from your buyer or seller. You can search newsgroups from www.altavista.digital.com or from www.dejanews.com. You can find out if the person you are buying from or selling to has a reputation.

Another option is to upgrade a system you already have. You can purchase faster processors, more RAM, and larger hard drives from vendors in each of the markets mentioned above. You will probably find that upgrading is more expensive than purchasing another system though. If you can live with a machine that is three or four years old, then you might look at buying a used or refurbished machine at a fraction of the cost of an upgrade.
Finally, when you buy or upgrade a machine, you may want to consider a few extras. Memory, a larger hard drive, and other extras usually will be cheaper when you buy your system. Many resellers will offer discounts on certain upgrades. Be sure to look into it. This is one advantage the larger mail-order businesses have. They give you a one-stop shop for your needs.

Here are some sources to get you started. Don’t forget to check out the resources and information in Chapter 23 for more Apple resellers and contacts.

MacConnection: 800-800-2222 - www.macconnection.com
Mac Warehouse: 800-221-8180 - www.warehouse.com
Small Doggy: 802-496-7171 - www.smalldoggy.com
User Group Store: 408-461-5700 - www.ugconnection.com
MacResQ: 888-447-3728 - www.macresq.com
Shreve Systems: 800-227-3971 - www.shrevesystems.com
MacWorks: 800-711-8679 - www.macworks.com
Lance Timco (Mailing List): 206-933-6090 - lance@lance.seanet.com
Tom Spearman (Mailing List): 650-493-7790 - email: mactime@znet.com

Buying What

What you get depends on what you want to do. We’ll look at some basic guidelines for a variety of uses. These are general guidelines and by no means permanent. Remember that people were doing high-end graphics, 3D animation, and other computer-intensive activities on the Mac long before the PowerPC chip came along. In just a few years even these guidelines will seem woefully inadequate as processor, memory, and storage demand continue upward.
Expect the general price points to be the same and expect to get more computer for that money. For example, just examining two ads from *Compu-America* in September 1996 and September 1997 shows this staggering price shift in action. First, in 1996 a 180MHz, 32 megs of RAM, 2-gig hard drive machine with an 8x CD-ROM would have run you $4,199. That exact machine cost just $1,899 in 1997. If you had been shopping for an entry-level Power Mac in 1996, you would have paid around $1,500 for 100MHz, 8 megs, 1-gig drive, and 4x CD-ROM. Today they advertise a 200MHz, 16-meg, 1-gig 8x CD-ROM machine for $1,099. Less money for more computer is just what the future holds in the computer world.

For a basic starter system destined for school or home, you should look to pay right around $1,000. This price may or may not include a monitor. Look to purchase a minimum of a 180Mhz PowerPC-driven Mac with 16 megs of RAM and at least 1 gigabyte of hard-drive space. Almost all systems you see will come with a CD-ROM. Make sure you get at least 4x, but 8x or better will probably be standard. You may or may not want a modem. Several models already include them. As always, shop around.

In this ballpark you should end up with a sturdy and dependable workhorse capable of handling any word processing, Internet, or household chores you throw at it. You can use it to design a Christmas card for the family, get online, do the household budget, and write letters or that great American novel you’ve been contemplating. The best upgrades to consider at purchase time are a Zip drive for added storage, more RAM, which always comes in handy, and a printer.

If you are shopping for a business machine, then you will want to optimize the day-to-day performance as much as possible. Look for a minimum of 200Mhz in your processor and 32 megs of RAM. Expect to see a lot of 8x and 12x CD-ROMs in this range and no less than a 2 gig hard drive. Also expect built-in Ethernet at this price. Prices will run from $1,200 to $1,500. You may also want to consider a DOS-compatible system or a card from Orange Micro. These will let you put a PC-com-
patible Pentium processor under the hood as well. You will probably want to invest in more RAM and more drive space for the PC-compatible side of things if you do. Another route to PC compatibility is the emulator like Real PC shown in Figure 2-10. This is a software program that pretends to be a DOS-based PC. If you go this route, invest in RAM since emulators tend to be RAM-hungry applications.

Figure 2-10: Real PC Emulator
One important Mac advantage in the business world today is its versatility. In addition to Mac software, you can run PC applications with either software emulators or built-in Pentium processors right under your Mac's hood. Any Mac since the early '90s can also read PC-formatted disks. If you want to go one level beyond that, you can use one of several software and hardware packages to seamlessly knit your Macintosh into a PC world. Need to print to a PC Printer? Try PowerPrint below. Want to share files with a PC? Try DAVE or the PC Talk MACLAN kit.

DAVE: Around $100 - If you need an easy solution to access Windows 95 or Windows NT machines on an existing network, then DAVE, from Thursby Software Systems shown in Figure 2-11 may be your answer. Using your existing network, DAVE lets you use TCP/IP to share files with other machines.

Figure 2-11: Thursby Software's DAVE
PCTalk MACLAN: Around $240 - The PCTalk MACLAN kit from Apexx Technology Inc. includes your hardware, software, and technical support right in one box shown in Figure 2-12. They bundle MACLAN Connect, discussed next, with either the PCTalk LocalTalk adapter or the EtherChain Ethernet adapter, letting your Macs and PCs talk to each other.

MACLAN Connect: Around $110 - MACLAN Connect from Miramar Systems lets Mac users mount PCs as if they were AppleShare devices. This means you can easily get to PC data out on the network.

PC MACLAN: Around $170 - Also from Miramar System, PC MACLAN lets your Mac talk directly to Windows 95 Machines using Win 95's built-in networking.

PowerPrint: If printing in the PC world is a problem for you, then you'll like PowerPrint from Infowave's Imaging Group, formerly GDT Softworks. Specializing in Macintosh printer drivers, Infowave produces products that will let you print to darn near everything. PowerPrint shown in Figure 2-13 allows direct connections to PC printers and PowerPrint Pro lets you print over a Novell network in the PC world.
For your money, expect to have a sturdy machine for office publishing, document creation, number crunching, and just about anything else you choose to toss at it. Things you may want to consider are a large monitor, more RAM, more drive space, and a tape backup system of some sort. A minimum of a 17-inch monitor should be considered if you expect to do a lot of office publishing and spreadsheet work. Look to spend a few hundred dollars extra for that. A tape backup should be considered standard if you plan on archiving several gigs of data. If you are working with smaller files, you may be able to get by with a Zip drive or some other removable media.

The next level of machines for graphics and publishing tend to be resource-hungry. Since you work with large files and lots of clip art,

Figure 2-14: AppleVision 1710 AV
storage and speed become a concern. Look to get the fastest machine you can, but settle for no less than 48 megs of RAM. You will find many systems shipping with 64 megs standard in this field. For hard-drive space, look to buy a large drive or even an array, which is made up of two or more drives linked together. They can provide both speed and security. Arrays are discussed more in Chapter 12—Drives and SCSI Voodoo. The fastest CD-ROM you can find is a must for file transfers, and you will want to buy the largest monitor you can afford. Some monitors like the AppleVision 1710 AV shown in Figure 2-14 make a reasonable compromise between performance, space, and size. Consider 17 inches a minimum. Since the Mac lets you add a monitor easily, maybe you should consider two. By adding a second video card and plugging a monitor in, you can instantly have access to more screen acreage. There are no strange drivers to install or settings to tweak. You can even reposition the monitors in relation to each other easily with the monitors and sound control panel shown in Figure 2-15. You can use a smaller monitor for palettes and tools while you work on the larger one for graphics and other projects. Expect to pay $2,000 for starters and look for prices ranging on up to $3,500.

Figure 2-15: Monitors and Sound Control Panel
You get speed and RAM in abundance at this price and you need it. Applications like Photoshop thrive here. Look to buy a lot of extras as well. You may have to juggle what you get and what you do without for a while. A scanner is very important if you want to import printed words or pictures into your Mac. A drawing tablet is also a useful tool for speeding up your work.

At the top of the heap are machines maxed out for performance and dedicated to intensive, processor-hungry demands like digital video editing and 3D rendering and animation. Look to spend $3,500+ for a powerful workstation in this category. Generally, demands require "as much as you can get" in each category. For video, faster SCSI and a disk array are probably in order. You can buy accelerator cards that will speed up your SCSI access considerably. You can also buy 3D accelerators for your 3D-intensive operations.

Figure 2-16: Powerbook 2400
You want to weigh portability when you buy a new or second Macintosh. You can get a very powerful machine in a very small package like the Powerbook 2400 in Figure 2-16. You can also get more full-featured machines with CD-ROM and expansion slots. Generally, these Powerbooks will cost more than an equivalent desktop model. You can expect from two to four hours of use per charged battery when you are on the go, so you may want to purchase a couple of extras and a battery charger while you are at it. The trackpad, smaller keyboard, and smaller screen all take some getting used to, and if you are planning to do any graphic-design work or heavy typing and editing, then you may be better served by a desktop system. Of course, many Powerbook models let you add an external monitor and keyboard as well, so you can probably make do.

What are those extras? What else can you buy for your Mac? The sky is practically the limit. Here is a short list of some extras you might consider at purchase time.

**Scanner:** $150 to $2,000+ - Scanners like the one in Figure 2-17 can be
had in almost any price range today. Down at the lower end, they are more than adequate for web page design and home use. A scanner lets you import a printed image into your computer. You can also use Optical character recognition, or OCR, software to recognize and import text for you. Price factors include the bit-depth or number of colors the scanner can scan; resolution, or dpi; the size of the scanner's scannable area; and how many passes it has to make for a color image. A single-pass, 2400dpi, 30-bit scanner will cost much more than a slower three-pass, 1200dpi, 24-bit scanner. Either would work for low-resolution web graphics.

**Digital Camera:** $150 to $1,000+ - The digital camera has come into its own in the last couple of years. For a family computer, it is almost impossible to imagine a better peripheral than a camera like the QuickTake 200 in Figure 2-18. You can take pictures and download them to your Mac at home. There is no film to buy and no development costs. You will pay more for higher resolution, built-in display, and the ability to take more photographs before downloading.

![Figure 2-18: QuickTake 200 Camera](image)
Controllers: $15 to $2,000+ - You can add extra devices to your ADB chain to control and gather information for your Mac. These include custom or expanded keyboards like the ones in Figure 2-19, program-

Figure 2-19: Custom and Expanded Keyboards

mable multibutton mice, or trackballs that enhance your current Mac experience. They can also be joysticks or tablets, like the one in Figure 2-20, that give you added control over your Mac. The latest thing in drawing tablet technology is the Wacom Technology PL-300 display

Figure 2-20: Tablet I/O Device
tablet that includes a built-in 10.4-inch active-matrix color display. Look to spend about $2,700 for that monster and considerably less for a regular tablet. When buying any of these devices, make sure it is Mac compatible.

Modem: $50 to $300+ - To get online in today's world means to get on the Internet. A computer without an Internet connection is almost unimaginable. You will need a modem to get online, and most new computers you buy will come with one. A modem converts the computer signal into something the phone lines will understand. At the other end of the call, another modem does the same thing in reverse. At the end of 1997, 33.6 is about the standard for modems on the market with newer 56K technology close on its heels. The 56K modems have some quirks and incompatibilities yet, so you will want to look into that before buying. See www.56K.com for more information. Beyond 56K modems lies the domain of ISDN, which is described and defined in Chapter 17. This service can be very expensive, depending on where you are. ISDN lets you move data very fast at either 64K or 128K, depending on your Internet service. You can find ISDN modems or terminal adapters for around $200 to $500.

RAM: RAM prices vary greatly but dropped to only a few dollars per megabyte in late 1997, a tremendous bargain. RAM is the best investment in the stability and ease of use you can make in your Macintosh. More RAM means you can load more applications at once, work on bigger files, and work faster.

Hard Drive: $200 and up - Having more hard-drive space means more storage for your files, games, applications, etc. You will find that no matter how much space you have, you will always fill it up. Expect to pay a premium for speed and size. The larger or faster a drive is, the more it will cost. For high-end graphics, video, and multimedia, multi-disk arrays and accelerated SCSI drives are the standard. You can buy either an external drive or an internal one. Generally, external drives will cost anywhere from $50 to $100 more than an internal drive like the
one in Figure 2-21. For that price you get the ability to plug it directly into your Mac's SCSI port on the back of the machine. An internal drive must be mounted inside the computer or another case.

**Recordable CD-ROM Drive:** Prices are falling - CD-Recordable drives are getting cheaper all the time. Several can be had for less than $500 today. You can create your own music and data CDs right off your Mac. You can use the relatively cheap CD-R media to archive your data, and you can play those CDs back in any CD-ROM drive. Look to pay from $2 to $5 for 650-megabyte CD-R disks. Generally, these are write-once-and-forget drives, although newer CD-RW drives let you re-record over newer CD-RW media. Either way you will need a large partition on your drive to make a master image for the CD recording software to follow. Unlike on a hard drive, you can't just drag-and-drop items to the disk. Look to pay more for speed, and with newer CD-RW technologies, take a close look at compatibility.

**Cards:** Price Varies - There are several different kinds of expansion cards for your Mac. You might consider getting a card to digitize video,
add another monitor, or accelerate 3D games and graphics. You can even get a card with an entire Pentium PC on board, as discussed earlier in the chapter. These cards plug into your Mac's PCI or NuBus slots. See Chapter 11–Changing Cards and RAM for more on the different types of cards and how to install them.

**Other:** There are other items too numerous to name. Browse through one of the catalogs mentioned in Chapter 23 to see a fuller list. These include devices like the U.S. Robotics Pilot shown in Figure 2-22 or Apple's new eMate or older Newton. With the addition of a palm-top system like this, you can take important notes, memos, and information from your computer anywhere. The Pilot is the current state-of-the art in these machines and has caught on like wildfire because of its performance and price. You can find one for less than $300. The new Apple eMate has just reached the consumer market after a successful release into the educational world. At around $800, the eMate offers a keyboard, built-in software, and a 24-hour battery life. It also has built-in PC-Card slots for expandability. You can add ISDN or a modem and use the built-in email and web browser to surf the Internet.

*Figure 2-22: U.S. Robotics Pilot*
Buying Strategy

There are several ways to approach buying a new Mac, from getting the fastest you can find to waiting on the next big improvement. Consider the following: that great new system you buy today will be worth less than half of its value in a year. (See the previous section for an example of this depreciation.) So how do you decide what to buy to meet your needs?

The first and most costly strategy is to simply buy the latest and greatest machine on the market. You can be absolutely sure this will be the fastest machine you could have found. If you buy from the top-of-model line, your choice will generally have more expansion and RAM slots. This means that relative to a machine from the bottom of the price curve, it will retain more of its value. You'll still lose more than 50 percent of your value in the first year, but it will hover there longer.

Another strategy is to just plan on buying last year's model. Most computer users on any platform will find that they can get away with far less horsepower than the top-of-the-line machines anyway. If you aren't planning on doing your own high-end graphics, 3D modeling, or digital video, then you can find some real bargains. Last year's top-of-the-line machine will cost about half what it did then and last year's bottom-of-the-line model may cost even less than half. Generally, they'll be half as fast as today's models, but at 100MHz in the used and refurbished markets, slow is definitely a relative term.

Another strategy is to buy from a single supplier. This may not be your choice. If you work for a school system or large business, then you may already have a preferred vendor to purchase from. One tip here is to get to know your salesperson. There may be extras, returned evaluation units, and special offers if you ask. The advantage to a small business or individual dealing with a single supplier is the relationship and knowledge level that will be built up. The small vendor knows what you have and knows what you need. If your time is more valuable than the cash, this may be the way to go.
THE MAC OPERATING SYSTEM (OS) HAS PROVIDED A CONSTANT interface to the Macintosh computer since 1984. One of the Mac's biggest strengths is its consistency. Keyboard shortcuts are the same from application to application. You can use `⌘` + `±` to quit almost any program. Once you learn how to cut, copy, and paste, those procedures are the same within programs and among them as well. You can cut information from one program and paste it into another using the same commands in both applications. There are even standard conventions for the layout of menus and the look of icons. Once you are familiar with the Mac's conventions, you can tell a lot about what is on the screen with just a glance.

This chapter looks at the Finder and how to navigate your Macintosh. The Finder is the program that gives you that Mac look and feel. It starts when your Mac does. In Chapter 4–The Startup & System Folder, we discuss the details of what your Mac does at startup and the contents of your System Folder. This chapter, on the other hand, teaches you how to get around.

Desktop

After your Mac starts up, you are greeted by something similar to Figure 3-1. This is the Mac desktop. In this section we'll look at the different elements of the desktop. Your actual desktop may vary depending on the version of Mac OS you are running, what external drives you have installed, or even what cosmetic changes you have made. The desktop is your general workspace in the virtual world of your Macintosh just like a
desktop or table top in the physical world. Each item in this illustration is discussed below.

First note the menu bar at the top of the screen. Each of those words is a menu that can be pulled down using your mouse. Just move the pointer over the File menu, for example, and click. You will need to click and hold the mouse button down in any version of the Mac system before Mac OS 8. You'll get a list of options similar to Figure 3-2. These options are commonly called menu items and are discussed in detail under the Menu Basics section below. Some of the menus on the menu bar are even hidden behind icons. Note the Apple and Finder icons at the far right and left corners of your screen. Clicking on them reveals menus as well.
The icons on your desktop represent objects in your virtual world. These little pictures represent hard drives, documents, applications, and other things in the Macintosh world. Typically you can find icons for hard drives, networked computers, floppy disks and CD-ROMs, or other storage devices on your desktop. We will discuss icons in detail shortly.
Figure 3-3 shows the most familiar icon on the desktop. This is the Trash icon. You can delete files from your hard drive by dragging them to the Trash icon. If someone tells you to throw away a file on your Mac, they simply mean for you to drag it to the Trash and let it go. The Mac doesn’t throw out your file right away. It waits for you to go to the Special menu on the menu bar and select Empty Trash before actually tossing out the files for good. You can also use the Trash as a handy eject button. Eject any removable disk by dragging it to the Trash, as shown in Figure 3-4. This is the easiest way to get a Zip, CD, or floppy out of the drive.

You will also have an icon similar to the one in Figure 3-5 on your desktop. This represents your hard drive. Generally the drive inside your Mac will be the icon in the top-right corner of the desktop. When you double-click on it, you open a window showing you all of the files on that hard drive. Windows and their parts and components are discussed in detail later in this chapter. Your hard drive may be called Macintosh HD, but you can name it anything you want. For information on this process, see Chapter 5—Organizing & Customizing Your World. As you already know, everything from a letter to Aunt Matilda to your corporate stock reports are represented by an icon in the Mac world. When you double-click on your hard drive icon, you’ll find all of these objects waiting inside as in Figure 3-6.
With Mac OS 8 and beyond, desktop printers have become a common sight in the Mac environment. The icon in Figure 3-7 represents a printer attached to your Macintosh. You can print files by dragging them to this icon, and you can see what files are already scheduled to print by double-clicking on this icon. Desktop printers are discussed in Chapter 10—Printing. Even though they are called “desktop” printers, you are no longer constrained to keeping them out on your desktop. If you like, you could place them anywhere on your Macintosh, including the hard drive and the Apple menu. We’ll discuss moving files around under the Icons section below.

One of your Mac’s most powerful built-in abilities is networking. Networking lets you connect one Mac to another. The icon in
Figure 3-8 represents another Mac or file server out on the network. These connections let you use another Mac's hard drive as if it were directly connected to your Mac. For more on networking see Chapter 9—Networking.

The strange looking pull-out tab in Figure 3-9 is the control strip. Macs first sprouted control strips on the Powerbook. It wasn't long until everyone wanted to use them, even on full-sized machines. They became a standard item with System 7.5.3 in 1996. They give you instant access to controls you use often. With a control strip, you control common Macintosh features such as audio CDs, networking, or even screen resolution right from the desktop. It made a lot of sense in the limited real estate of the small Powerbook screen. You can get extra control strip modules to do almost anything. The most common control strip modules are those for battery usage and consumption on the Powerbook. The next most common are those dedicated to AppleTalk and file sharing.

You don't have to keep your desktop looking like the one in this chapter, either. You can customize everything from the size of the icons to the background picture. You can even leave often-used files and utilities on the desktop for easy access. See Chapter 5—Organizing & Customizing Your World.

Icons

The ever-present icon forms the heart of your Mac's finder. As you already know from your own experience or Chapter 1, icons represent other things. Even the outside of your Mac is covered with them. On the
A big part of the Mac's appeal is its personality, or more precisely, its reflection of your personality. So now that we've looked at a fairly tidy desktop, let's take a look in Figure 3-10 at the chaotic mess that is my PowerBook 2300c desktop. As you'll see in Chapter 5, you can do a lot to change the look of your Mac. I change the look of my desktop every month or so. I habitually experiment with different organization schemes. I play with keeping different tools and toys on the desktop. Generally I keep so many icons out on the desktop that anyone using my machine groans in agony when they try to find something.

The point is, keeping your Mac lively is one of the great joys of using this machine. Take advantage of it. You can make your desktop much more useful by making it your own. Notice a couple of tricks that I use. I have a pop-up window with commonly used communications utilities in one corner. I've even set the items inside to act like buttons with the As Buttons option under the View menu making them easier to launch. I've set my icons on the desktop to their smallest size with the View Options... menu item in the View menu. This means I can pack even more of them on the screen. I have become a big fan of the control strip, and I love changing background designs and patterns with the Desktop Pictures control panel. One recent theme: the fantastic 1984 film *The Adventures of Buckaroo Banzai*. Now, if Lucasfilm would just buy the rights and shoot the sequel, I'll clean up my desktop and die happy!

—Sandy Clark
desktop and elsewhere in the finder, icons represent storage devices, software programs, or the files they create. What you do to the icon happens to the data it represents.

**Icon Bestiary**

There are several different types of icons, and you can tell quite a bit just by looking at them. For example, look at the generic icons in Figure 3-11. These are the generic icons for *applications* and *documents*. Applications are the programs, like Microsoft Word or ClarisWorks, that your Macintosh runs. Documents are the files you create with them. You can even use a game application like Marathon to create a document called a saved game.

The document icon looks like a page with the corner turned down, and the application icon looks like a baseball diamond. In almost every place you see them, icons for applications and documents will look basically like this. If the document or application makes another icon available to the finder, the Mac will use that instead. Look at the custom icons in Figure 3-12. Notice how they all retain the basic look of the generic icons you saw earlier? This makes sorting the programs from the files they create easier. You can see the difference at a glance.

Another common type of icon is the folder shown in Figure 3-13. Like any other icon on your Mac, folders can be customized as well. Folders work like file folders in the real world. You can fill them up with documents, applications, and even other folders to organize your Mac. New folders can be created from
the File menu at the top of the screen. This New Folder command is discussed under the File section of Menu Basics below. To open a folder, just double-click on it.

Disks from floppies to Zips are represented as icons as well. You’ve already seen the generic icon for a hard drive as it appears on the desktop. As you insert them, the icons for other drives appear on the desktop as well. Figure 3-14 shows several different disk icons. Simply inserting a disk into the floppy drive slot prompts your Mac to display the appropriate icon. Remember, what you do to the icon, you do to the drive it represents. This makes it very easy to move things around on your Mac. For example, if you wanted to copy the entire contents of a floppy disk to your hard drive, you would simply drag the floppy icon to the hard drive icon. The Mac will copy the entire floppy disk to the hard drive. You will find it inside the hard drive in its own folder.

Moving Things Around

On the Mac you manage, copy, and reorganize files by simply dragging their icons around. You should already know how to use your mouse to select and drag icons. If you don’t, see Chapter 1–Meet the Mac for a quick refresher.

You can select multiple items by drag selecting them. To do this, click and hold down the mouse button while moving the pointer in a diagonal line. A box will grow out from the point where you started dragging and every icon touched by this box will be selected. In Figure 3-15 you can see this is a useful way to select several items at once.
Another useful trick for selecting items is the `shift` key. When you hold down the `shift` key while clicking on an icon, you can add or remove it from a group of icons you have already selected. Look at Figure 3-16. Using the example for drag selecting items above, you could `shift` + click on any item to deselect it. In Figure 3-17 you can see an example of using `shift` + click to select several different items in a crowded window.

![Figure 3-16: Using Shift + Click to Deselect Icon](image)

To open any folder, disk, or hard drive on your Mac, simply double-click on it. As discussed in Chapter 1, a double-click is a pair of rapid clicks of the mouse button. To double-click your hard drive as an example, position the pointer over the icon for the drive as shown in Figure 3-18 and click the mouse button twice in rapid succession. The drive
Figure 3-17: Using Shift + Click to Select Multiple Icons in List View

Figure 3-18: Mouse Pointer Over Drive Icon
should open as shown in Figure 3-19. If it doesn't work for you right away, practice. Two common mistakes are moving the mouse between clicks and clicking the mouse too slowly for the Mac to register a double-click.

To move a file or folder from your hard drive and onto the desktop, simply click and drag it from one location to the next. In Figure 3-20 the file named “Picture 1” is being dragged to the desktop. Every disk your Mac uses has a desktop area. By moving the file, you haven't actually removed it from the hard drive. You could just as easily drag the same file to another folder.
For example, you could drag the same file to a folder and then drag the folder back to the hard drive, as shown in Figure 3-21.
Notice how the untitled folder darkened when the pointer dragging it moved over the folder. This tells you that your target is selected and letting go of the mouse button drops the file to its new location. This same basic skill can be used to copy files from one location to another across drives or even the network. By holding down the `option` key while dragging an icon, you can duplicate it as shown in Figure 3-22.
When you insert a floppy disk, it appears on the desktop. We can copy our example seen in Figure 3-23 just by dragging and dropping. When you move something to a new drive, such as a floppy, Zip, or another hard drive, a Copy to new folder window appears. You can learn a lot from the Copy to window shown in Figure 3-24. First, the status bar in the center of the windows approximates how much of a job remains. The number of items left to copy can be found in the upper-right corner, and the entire file transfer can be canceled by clicking the Stop button. At the bottom of the window, your Mac estimates how much time is left. Clicking on the small triangle to the left of the Time remaining: information gives you the added details shown in Figure 3-25.

![Figure 3-24: Copy To Window](image-url)

![Figure 3-25: Items Remaining: for Copy Detail](image-url)
CHAPTER 3: FINDER & MENUS

Figure 3-26: Copying Multiple Items Under OS 8

Figure 3-27: Folder Contents
Starting with Mac OS 8, you can copy several files at once. If you do, your screen may look something like Figure 3-26 with several jobs happening at once. This is especially handy when you have several things to back up or copy in the background while you get on with your work.

If we take a last look at our floppy disk from the example above, we find it contains a folder called Untitled Folder, which we copied there. Double-clicking on the folder reveals the Picture 1 file we began with as shown in Figure 3-27. You can use the ability to nest folders and files inside other folders and files to make your Mac a neater place. We'll discuss organizing strategies in Chapter 5—Organizing & Customizing Your World.

You can launch the application associated with any document simply by double-clicking on it. Take a look at the ClarisWorks file in Figure 3-28. Double-clicking on it launches ClarisWorks and you can get busy working. You can also open a document with any application you like right from the desktop by simply dragging the document icon over the application icon.

Take Figure 3-29 as an example. By dragging the SimpleText file to the ClarisWorks icon and dropping it, you can open the file in ClarisWorks. If the target application highlights when you drag a document over it, then it will probably recognize and open that document for you. Remember this handy trick when you have several documents you want to open at once. You can drag and drop them on the application all at once, saving yourself the time and effort of opening the individual files.
I know you are just dying to find out how these different programs and files remember just who and what they are. I mean, really! How does a ClarisWorks document know it is a ClarisWorks document? How does it remember where to put things? You actually don’t need to know how it works to use your Mac, but I’ll spill the beans anyway. All of that information is remembered by the invisible desktop file. Occasionally, you need to restart while holding down the option + esc keys to rebuild this file. You’ll learn more about that in Chapter 13—Preventive Maintenance

There are actually two parts to the desktop file. The first is the desktop DF which keeps up with where your files are. It remembers every time you move or delete a file. The desktop DB file keeps up with what program created a file and what kind of information it contains. This is remembered as creator codes and type codes. Both of these codes are made up of four letters. A creator code indicates who created the file. For example, a file with the creator code BOBO was created by ClarisWorks. The type code tells you what the file is. The BOBO file above could be a lot of things such as CWDB = ClarisWorks Database Format, TEXT = Plain Text File, or CWWP = ClarisWorks Word Processing. There are dozens of codes.

There are many utilities out there that will let you modify these codes. This can be useful when you want files to open in a certain application when you double-click them. It also helps clean up documents off of a PC. If you know the codes, you can tell a file to be a Word for Windows file and launch ClarisWorks. If ClarisWorks has a translator, which it does, the file will open. One of my favorites is Drop Attribute shown in Figure 3-30.

—Sandy Clark
Menu Basics

There are two types of menus on the Mac. The first and most abundant are the *pull-down* menus shown in Figure 3-31. The other type of menu is the *pop-up* menu like the one in Figure 3-32. Since pop-up windows are commonly found on control panels and other dialog windows, they are discussed under Windows and Controls below.

![Figure 3-31: Typical Mac Pull-Down Menu](image1)

![Figure 3-32: Typical Mac Pop-Up Menu](image2)

You have probably already noticed and used those menus at the top of the screen before. One of the most powerful benefits they provide is consistency between applications. You will always find the Copy and Paste commands under the Edit menu regardless of the program you are in. To open any menu, just place your pointer over the name of the menu and click the mouse button as shown in Figure 3-33.

In every System version before Mac OS 8, you had to hold down the mouse button to keep the menu open. Now the menus drop down and
stay put. Just point at the menu item you want and select it with another mouse click. To make your job easier, the menu selections will highlight as you move the mouse over them.

**Apple Menu**

The first menu at the left end of your menu bar is under the Apple icon shown in Figure 3-34. This menu doesn't usually change from program to program. The Apple menu is a sort of catch-all for utilities, controls, and System information. What you see under this menu could vary greatly from the illustration. You can add or delete items from this menu by adding them to or removing them from the Apple Menu Items folder inside your System Folder as shown in
Notice those funny-looking letters and symbols to the right of each menu item? Those are the keyboard shortcuts for the menu items they are next to. You can choose that menu item by typing the key combination shown and never even touch the mouse. For example, pressing `command` + `p` has exactly the same effect as choosing the Print command from the File menu. Even better, these same commands work in almost every application. The most common ones are listed below:

<table>
<thead>
<tr>
<th>Command Description</th>
<th>Key Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancel an action</td>
<td><code>command</code> + <code>d</code></td>
</tr>
<tr>
<td>Select all items</td>
<td><code>command</code> + <code>a</code></td>
</tr>
<tr>
<td>Copy a selection</td>
<td><code>command</code> + <code>c</code></td>
</tr>
<tr>
<td>Duplicate</td>
<td><code>command</code> + <code>p</code></td>
</tr>
<tr>
<td>Eject a disk</td>
<td><code>command</code> + <code>e</code></td>
</tr>
<tr>
<td>Find</td>
<td><code>command</code> + <code>f</code></td>
</tr>
<tr>
<td>Find Information</td>
<td><code>command</code> + <code>l</code></td>
</tr>
<tr>
<td>Make alias</td>
<td><code>command</code> + <code>m</code></td>
</tr>
<tr>
<td>New item</td>
<td><code>command</code> + <code>n</code></td>
</tr>
<tr>
<td>Open an item</td>
<td><code>command</code> + <code>o</code></td>
</tr>
<tr>
<td>Print</td>
<td><code>command</code> + <code>p</code></td>
</tr>
<tr>
<td>Quit</td>
<td><code>command</code> + <code>q</code></td>
</tr>
<tr>
<td>Save</td>
<td><code>command</code> + <code>s</code></td>
</tr>
<tr>
<td>Paste item</td>
<td><code>command</code> + <code>v</code></td>
</tr>
<tr>
<td>Close</td>
<td><code>command</code> + <code>w</code></td>
</tr>
<tr>
<td>Cut item</td>
<td><code>command</code> + <code>x</code></td>
</tr>
<tr>
<td>Put away</td>
<td><code>command</code> + <code>y</code></td>
</tr>
<tr>
<td>Undo</td>
<td><code>command</code> + <code>z</code></td>
</tr>
</tbody>
</table>
Figure 3-35. In fact, you can use this menu to make your life a lot easier by adding to it items that you use often. See Chapter 5—Organizing & Customizing Your World for tips on using the Apple Menu to make your life easier.

Starting from the top, we’ll look at 17 items you will probably have in your Apple menu under Mac OS 8. The first item is About This Computer.... On Systems 7.6 and earlier, this selection was About This Macintosh.... Either way, the function is still the same. This menu item tells you about your memory usage.

In Figure 3-36, About This Computer tells us that this Mac is running Mac OS 8, has 20 megs of built-in memory, and is using virtual memory to bump the available RAM up by 2.7 megs. This window also tells us what applications are running, how much RAM they are using, and that the largest unused block of RAM is 11.9 megs. This is all useful information if you find yourself getting out-of-memory errors.
The Apple System Profiler menu item is another tool for learning about your system. It launches like a menu item, but it is actually an application that has one mission in life. It lives to profile your system. This OS 8 addition is one of the best tools you can have for tracking down problems. When you launch Apple System Profiler, it presents you with a window similar to the one seen in Figure 3-37. In addition to this information on your system, you can bring up seven other system profiles from the Select menu. These other profiles cover everything from hard drive info to the applications you have installed.

You can also use Apple System Profiler to create a report that tells you just about everything there is to know about your Mac. If you look under the File menu, you will see the Create Report... menu item. Selecting this brings up the window in Figure 3-38. From here you decide what information to include in the final report. The final report will look something like the one in Figure 3-39. Notice that the report includes the version numbers for all control panels, extensions, and applications installed. This kind of information can be invaluable when you call for customer assistance or are trying to track down a sticky conflict between software.
Create a report consisting of the following information:
System Overview will be in the report by default.

- [ ] Network/Communication
- [ ] Control Panels
- [ ] Volumes
- [ ] Extensions
- [ ] Devices
- [ ] System Folder
- [ ] Applications

Figure 3-38: Create Report... Menu
**System Overview**

- **Customer Care Code:**
- **Machine:** Power Macintosh 6100/60
- **Machine ID:** 75
- **Finder:** v8.0
- **System:** v8.0 US
- **Processor:** PowerPC 601 at 60 MHz
- **Active Enabler:** n/a
- **OpenDoc:** v1.2.1
- **Memory Installed:** 72 MB
- **Virtual Memory:** is off
- **Total Memory:** 72 MB
- **Disk Cache:** is on, 1024K
- **Startup Device:** Unknown

**Networking Information**

- **File Sharing:** is off
- **AppleTalk Zone:** Unknown
- **Chosen Printer:** LaserWriter 8 (8.4.3)
- **AppleTalk zone:** Unknown
- **Active Port(s):** LocalTalk (printer) built-in

**Network Software:**

- Open Transport (v1.2) present and loaded
- AppleTalk present and loaded
- TCP/IP present but not loaded

---

*Figure 3-39: Apple System Profile Final Report*
The next item in the Apple Menu is the Apple CD Audio Player for playing music CDs. Shown in Figure 3-40, this control works just like your home CD player with a few extra twists. You can use this control panel to jump from track to track and even reorder the play list. You can even type in the names of the tracks and your Mac will remember them the next time you insert the same CD. It stores these settings in the Preferences folder.

The Automated Tasks folder under the Apple Menu contains several AppleScripts for completing automated tasks. AppleScript is discussed in greater detail in Chapter 5—Organizing & Customizing Your World. In a nutshell AppleScript lets you automate tasks by recording repetitive actions and then executing them at a later time. You can even get applications that are AppleScript savvy to talk to each other and complete tasks for you. Mac OS 8 includes several scripts for file sharing and adding an alias to the Apple menu in this folder. You can add more to this folder in your Apple Menu Items folder inside the System Folder.
The Chooser is possibly the most important item in your Apple menu. From the window in Figure 3-41 you can select among printers or even connect to other machines on the network by simply clicking on the appropriate icon. See Chapter 10—Printing for more information on the Chooser and printing. See Chapter 9—Networking for more information on the Chooser and networking.
Figure 3-42: Shortcut to Control Panels Folder in Control Panels Menu

The Control Panels menu item gives you a shortcut to your Control Panels folder in the System Folder. Figure 3-42 shows you a typical look into this item. Control Panels let you control various aspects of your Mac and the programs on it. You can learn more about specific Control Panels in the next chapter.
The handy Calculator is another application hiding under your Apple menu. You can use your mouse to manually click the buttons, but the truly calculator savvy have learned to use their numeric keypad located on the right end of many keyboards to do their calculating. In calculatorese, the * symbol stands in for multiplication and the / fills in for division.

When something goes missing on your Mac, the Find File menu item shown in Figure 3-43 is your ticket to finding it. The most common search you will conduct is simply for the name of the file as shown, but by clicking on the More Choices button a wealth of pop-up menus can give you hundreds of other search combinations. Just look at the powerfully complex search in Figure 3-44.

![Figure 3-43: Find File Menu](image1)

![Figure 3-44: More Choices in Search Window](image2)
The Note Pad and Scrapbook menu items are useful areas for making notes and saving data. When you cut or copy something from an application using the commands in the Edit menu discussed later, you can open the scrapbook and paste it there for safekeeping. As you can see in Figure 3-45 it is possible to paste any data into the scrapbook including

Figure 3-45: Scrapbook Paste Sample

Figure 3-46: Notepad Tool Display

To Do:

Finish Chapter 3
Take Screen Shots
movies, graphics, text, or even a sound. The notepad shown in Figure 3-46 is strictly a tool for text. It is a great place to type reminders, notes, and messages.

Three menu items toward the bottom of the Apple menu keep track of what you have done and where you have been. These are the Recent Applications, Recent Documents, and Recent Servers folders. When you select one, you should see something similar to Figure 3-47. The number of items remembered by these folders is controlled by the Apple
Menu Options control panel shown in Figure 3-48. They contain aliases of the documents you have used recently, the programs you have run, and the file servers to which you have been connected. Though most people shut them off, they can be a very handy way to keep recent work at hand.

When you need to look at a sample of text in a specific font or can't use your keyboard for some reason, the Key Caps Apple menu item in Figure 3-49 can be a lifesaver. You can use the mouse to type text by clicking on the appropriate keys. You can change fonts under the Key Caps menu on the menu bar, and you can cut the text you type out of the text box to paste into another application. This is a handy trick to remember if you ever encounter a dead keyboard.

You can also change your alert sounds or record a new one with the SimpleSound item in your Apple Menu. From the Sound menu shown in Figure 3-50 you can set a sound quality to record in or select between
Figure 3-49: Key Caps Apple Menu

Figure 3-50: Sound Menu
installed sounds. By selecting New under the File menu, you can record a new sound on any Macintosh equipped with a microphone and sound input. Today that is just about every Mac made.

Stickies are the digital equivalent of Post-it Notes™. Now you can make your Mac's desktop look just as cluttered as your real desktop. Several are shown in Figure 3-51. When you launch Stickies, you can create new notes or import text from the File menu, change text styles under the Note menu, and set sticky color under the color menu. This is a handy way to leave small messages on screen for yourself or co-workers.

They say "All work and no play..."—well, you know the rest. The Jigsaw Puzzle item is a simple distraction that replaces the earlier puzzle so familiar to longtime Mac users. Both are shown in Figure 3-52. You can even cut and paste your own picture into the jigsaw puzzle or
use the Open menu item under the File menu to import a new one. Select Start New Puzzle from the Options menu to scramble the pieces as shown in Figure 3-53. Have fun!

Figure 3-52: Jigsaw Puzzle and Original Puzzle Display

Figure 3-53: New Puzzle Scramble for New Game
File Menu

The File menu is next on your menu bar. Located to the right of the Apple menu, the File menu will generally contain the commands you need to print, create a new document, or open and save a file. In Mac OS 8, your File menu will look something like the one in Figure 3-54. In other applications the contents will vary, but Open, Save, Print, and New Document controls should be here if they are available.

![Figure 3-54: Apple OS 8 File Menu](image)

File

- New Folder
- Open
- Print
- Move To Trash
- Close Window

Get Info

- Label
- Sharing...
- Duplicate
- Make Alias
- Put Away

Find...

- Show Original

Page Setup...

- Print Desktop...
The New Folder menu item creates a new folder in whatever window you happen to be working in. If you select New Folder from the File menu, you will get the untitled folder in Figure 3-55. You can rename that folder by clicking on the folder name and then typing in a new one.

When you select the Open menu item, the Mac launches or opens the selected document, application, drive, or folder. This works just as if you had double-clicked on the item. You also have a Close Window command that will close any open window.

All of your print functions are located in the File menu as well. The Print command will generally print the document you are working on in an application. From the Finder, the Print command will print any document you have selected by launching the application that created it. This saves you the steps of opening the application and then printing the document. You can also select multiple documents and use this command to print them all.

The Page Setup command brings up the dialog box in Figure 3-56. You can specify the paper type and other printer settings from this win-
dow. The Print Window menu item prints the selected window from the finder. This can be a useful way to print a catalog of the files on your Zip or floppy disks. Chapter 10—Printing discusses your printer options in detail.

You can launch the Find File application with the Find... menu item in the File menu. This option is discussed under the Apple menu above. You can also use the Put Away command to place files back where you found them. If you pulled a dozen files out of System Folder while you were troubleshooting a conflict, it could turn into a real chore putting them back. You could simply select them and choose Put Away from the File menu to place them back where they came from. The Move To Trash command will place any selected item in the trash.

A powerful tool for organizing your Mac is the alias. The Make Alias and Show Original commands in the File menu deal with them. When you select a file or application and then choose Make Alias from the File menu, you create a pointer to the original item that behaves just like the original. Figure 3-57 shows an alias being created for the Photoshop application. You could then launch Photoshop by double-clicking on the alias. This saves a lot of space compared to copying the entire application to the desktop, since the alias takes up only a few thousand bytes of storage on your drive while the original application could be megabytes in size. Place the alias wherever it would be handy. You can even drag-and-drop files on an alias to launch them. When you select an alias, the Show Original item in the File menu will take you to the origi-
nal document or application. See Chapter 5—Organizing & Customizing Your World for more information on using the helpful alias to make your Mac a more convenient place.

When you select a file in the Finder, the Get Info item in the File menu will tell you more about it. Just select the icon of your choice and choose the Get Info menu item to see a dialog similar to those in Figure 3-58. These are often referred to as info boxes. From an info box you can change an application's memory allocation, see how much space a file or folder takes up, record comments about the file, and find out what kind of document you are dealing with. In this case we are looking at the info boxes for Photoshop and its alias from the previous example.
Notice how much smaller the alias is than Photoshop.

One final menu item in the File menu is the Duplicate option. You can use this command to make a copy of any selected file, document, or application. Figure 3-59 shows you Duplicate at work. To duplicate a file, simply select it, then choose this command from the File menu.

**Edit Menu**

The Edit menu contains some of the most powerful tools in the Mac world. In addition to cut, copy, and paste capabilities, this menu gives you the powerful Undo menu item. This item is often referred to by its keyboard shortcut as Command Z for the ⌘ + Z keys. In most applications this command will undo the last thing you did. Talk about a lifesaver. Did you just delete half of that document you were working on? Select Undo from the Edit menu and reverse the disaster.

The other commands of note in the Edit menu are Cut, Copy, and Paste. With these commands you can move just about anything around inside an application or even between applications. The examples in Figure 3-60 show you the basic functions of the Cut, Copy, and Paste menu items. In this example the text is selected by clicking and dragging the pointer over the word you want to choose. You can Copy that word from the Edit menu and then select a new location with your pointer and Paste it elsewhere. When you Cut an item, it disappears completely until you Paste it into its new location. Practice Cut and Paste a few times and you will find them invaluable. You can move almost any object you can select this way. This includes pictures, sounds, or even the cells from a spreadsheet.
Two final commands related to selecting files are the Select All and Clear menu items. Figure 3-61 shows you the effects of Select All on an open window. The command literally selects all of the items for you. The Clear menu item can be used to clear a selection such as the folder name in Figure 3-62.
You will also find the Preferences menu item under the Edit menu. When you select it, you are presented with the dialog box shown in Figure 3-63. You can change several things, from the names of labels to the font used for text in the Finder. One useful selection for making your menus simpler is the Simple Finder option. With this on, seldom-used menu items simply don’t appear. Just look at the File menu or Edit menu under Simple Finder in Figure 3-64.

![Figure 3-63: Edit Preferences Menu](image)

![Figure 3-64: Simple Finder Display](image)
View Menu

The View menu provides settings for changing how you look at the information in your windows. The effects of the As Icons, As Buttons, and As List menu items are shown in Figure 3-65. They change the view of the active window only. The icons are the most common way to view your files. The As Button option makes each icon into a button that opens with a single click. This can be a useful tool to simplify access for someone. The As List menu item opens up some powerful sort options right in the window. See the section on windows in this chapter for more tips on using the list view. When viewing by icon, the Clean Up menu item under the View menu will straighten a messy window, as shown in Figure 3-66.

Figure 3-65: As List Menu Items Display
CHAPTER 3: FINDER & MENUS

With Mac OS 8 the pop-up window was introduced. Pop-up windows spring up from the bottom of the screen where they rest as tabs when inactive, as shown in Figure 3-67. You can change a window with the As Window or As Pop-up Window menu items under the View menu.

The Arrange and View Options menu items change depending on the view you have selected from the As Icons, As Buttons, and As List menu items above. The Arrange menu item becomes Sort List when you have As List selected. Either way, it lets you adjust the icons or list items by criteria such as name, size, or kind of file as shown in Figure 3-68.

When you select the View Options menu item you will get one of the three dialog boxes shown in Figure 3-69. Again, this depends on your other selections in the View menu. As you can see, View Options gives
Figure 3-67: Inactive Pop-Up Menus in OS 8

Figure 3-68: Arrange Menu Display
CHAPTER 3: FINDER & MENUS

Figure 3-69: View Options Dialog Display

you control of the icon sizes and the information included in your windows.

Special Menu

The Special menu contains tools for disks, shutdown, and the trash. The first menu item, Empty Trash, gets rid of any files you have placed into the Trash. Are there files in the Trash? The Trash icon will tell by spilling trash out the top, as shown in Figure 3-70.

As you might guess, the Eject and Erase Disk menu items deal with disks. If you select a disk or CD and then choose Eject, the disk will eject. You can use this as an alternative to dragging the disk to the Trash. As discussed earlier, your Mac will eject any removable disk you drag to the Trash.

The final three items in the Special menu are Sleep, Restart, and Shut Down. The Sleep menu item appears on Powerbooks and puts the Mac into a low-power mode to save battery charge. This is called sleep mode. A sleeping Mac will wake at the touch of the space bar. Additionally, it will come right back to the place you quit working. Any documents you had

Trash
Figure 3-70: Full Trash Icon
open will remain open and any work you were busy with will be waiting for you. Waking your Mac takes just a few seconds at most.

When you select Shut Down from the Special menu, you start a process of checking for open applications, updating the desktop file, ejecting disks, and generally cleaning house. This is important to keep your applications happy and keep the System's temp files straight. It also gives you a chance save any work you may have open. A friendly reminder like the one in Figure 3-71 can be a lifesaver if you forgot about work you hadn't saved in an open application. Restart in the Special menu works just like Shut Down except that when the Mac is done it immediately begins startup again.

**Help Menu**

Selecting About Help under the Help menu gives you the underwhelm-
This is an alias for an application. To open the application, open this alias. To drag an item to the application, drag it to this alias.

Figure 3-73: Typical Balloon Help Display

Help by choosing the Hide Balloons menu item that has mercifully appeared in the Help menu.

The Help menu item brings up the window in Figure 3-74. This is more than just simple encyclopedic help information. The Mac will actu-
ally walk you through tasks and procedures on the Mac. For instance, take a look at the Help window in Figure 3-75. Mac OS Help walks you through the steps in selecting a printer by showing you what to do with the windows in Figure 3-76. It even highlights the menus and options for you as in Figure 3-77. Next to a demystifying reference tome, the Help menu item might be the best Mac reference you will ever find.

![Figure 3-75: Mac OS Help Window](image)
How do I select a printer?

Do This: On the left side of the Chooser, click the type of printer you want to use. Do this step, then click the right arrow.

Figure 3-76: Printer Selection Help Window

Figure 3-77: Printer Selection Help Window With Menu Items Highlighted
Finder Menu

At the far-right corner of your menu bar you will find the Finder menu. It will look like the Finder menu in Figure 3-78. Depending on which version of the Mac OS you have installed, it may vary slightly. You can use this menu to switch among open applications. Of course, the contents of this menu vary depending on which applications you have open. Each application appears on the menu as shown in Figure 3-79. The icon on the menu bar also changes depending on which application you are in at the moment. This current application is known as the active application.

You can hide any inactive applications with the Hide Others command on this menu or show all applications with the Show All menu item. There will also be an option to hide the active application from this menu as well. To hide one application as you switch to another, just hold down the [option] key while selecting the new application from the Finder menu. This will cause all of the formerly active application windows to hide themselves. You can bring them back individually by selecting an application's icon in the Finder menu or display them all by selecting the Show All menu item.
Windows & Controls

There are several other common windows that you will encounter from application to application. Since they are all basically the same, a brief discussion of window shortcuts and standards will serve you well across a range of applications. A standard collection of buttons and toggles is discussed below.

Controls

Mac applications use a common set of controls in the various windows and dialog boxes you encounter. You have already seen most of them in the dialog boxes associated with Menu Basics above. The five basic controls plus the pop-up menu are shown in Figure 3-80. Basic buttons are activated with a simple click of the mouse. The checkbox is used when there are two options available. It can be checked on or checked off with a mouse click. It is often used to select actions that will occur once the current dialog or window is closed. The radio button is similar to the checkbox in that you click once to select it. Generally you find radio buttons in locations where several options are available.

![Figure 3-80: Five Basic Controls Display](image-url)
Two of these items aren't buttons: the *dial* and the *pop-up menu*. The dial is also called the *slider* by many Mac users. It can be used to select the magnitude, intensity, or amount of a value by sliding the little square box with the mouse or clicking on the arrows at the end of the control. The pop-up menu is often used to switch among entire banks of controls. Look for a good example in the LaserWriter 4/600 menu shown in Figure 3-81. It appears when you select the Print command from the File menu.

*Figure 3-81: LaserWriter 4/600 Control Menu*
In any given program or application the style of these controls can vary greatly. In most cases they should operate in a fashion similar to the way we have described.

**Basic Window**

When you double-click on any hard drive or folder, you are presented with the basic window. This basic window is made up of several different parts labeled in Figure 3-82. The *Title Bar* can do more than just display the name of the open window. By clicking and dragging it, you can move the entire window. The *Close Box* closes the window when
you click on it, and the *Collapse Box* closes the window up to the title bar, leaving just the top portion of your window as in Figure 3-83. This can be a useful way to temporarily close a window to save space.

![Image of Title Bar](image)

*Figure 3-83: Title Bar*

You can resize the window by clicking and dragging on the *Size Box* in the lower-right corner. By clicking the *Zoom Box*, you can open the window to reveal all of its contents if possible. Another click of the Zoom box returns the window to its previous size.

You can use the *scroll bars* to move the window's viewable area. Sometimes there is just more stuff in a window than will fit on the screen. You can click on the arrows to move the view or you can just drag the square control in the scroll bar.

When you have several windows on the screen, only one of them will be an *active* window and others will be *inactive* windows. An active window is the one currently in use. It will rest in front of any inactive windows. In addition, inactive windows will be grayed out as shown in Figure 3-84.
Basic Save and Open Dialog

Choosing the Save or Save As options from almost any application will bring up a window like the one in Figure 3-85. This is a basic Save File window that will work the same from application to application. The pop-up menu at the top of the window shows the current directory. This can be anything from a folder to the desktop. You can click on this pop-up menu to move up through the directories above your current one. The list in the middle of the window shows you other files in the current directory. There will also be a text box for naming the file you are about to save.
In addition to these basic options, you may have an opportunity to change the type of file you save. In many applications you can save in not only the native format of the application but several other formats as well. For example, Photoshop will let you save JPEG, GIF, or other file formats in addition to saving Photoshop files.

Look for several common buttons including Save, Eject, and Desktop. The Desktop button instantly changes the list view in the middle of the window from the current directory to the desktop as shown in Figure 3-86. The Eject button will eject any selected Zip, CD, or other removable disk. The Save button writes your file to disk.
The New button with the folder icon on it brings up the dialog in Figure 3-87. This lets you create and name a new folder from within the Save dialog. This can be handy when you realize that you need a new folder for the current file. The Cancel button closes the Save dialog without saving anything.
Basic Installer Dialog

When you install software on your Mac, the process usually involves running an application called an *installer*. There are two major brands or flavors of installers on the Mac platform made by Apple and Aladdin. Apple’s installer is familiar to anyone who has ever installed System software or any other software from Apple. Aladdin’s InstallerMaker is available to anyone for a small fee and is used by hundreds of other software developers. In addition to these two installers, you will likely encounter a few others. Generally they work the same and the instructions here can be used as a guide.

*Figure 3-88: Typical Installer Display*
Launching any installer is the same no matter where it came from. Figure 3-88 shows an installer sitting on the desktop, an installer on a CD-ROM, and an installer on a floppy disk. A simple double-click on any of these will launch it. Figure 3-89 shows you the controls for the Apple QuickDraw 3D installer software. It typifies the basic Apple installer.

![Apple QuickDraw 3D Installer Display](image)

Figure 3-89: Apple QuickDraw 3D Installer Display

The Install button will go ahead with an Easy Install as selected in the pop-up menu at the top-left corner. The Destination Disk controls let you select where to install the software, and the Quit button will cancel the installation and leave your disk untouched. You can select more install options by clicking on the pop-up menu at the top-left corner of the window. The two most common options are Custom Install and Custom Remove.

From the Custom Install menu shown in Figure 3-90 you can select just part of the software to install. This is handy if you have accidentally deleted part of the software or need only one piece for some reason. In
this example, you can install the SimpleText application from inside the QuickDraw 3D installer. To select an item to install, just activate the check box located to its left. The little $i$ icon located to the right of the items in the installer window will tell you more about the selection, as shown in Figure 3-91. Selecting the Custom Remove pop-up menu gives you an identical window to the one for Custom Install with the addition of a Remove button in place of the Install button. Selecting the check box next to an item and then clicking the Remove button removes it from your hard drive.

![Figure 3-90: Custom Install Menu](image)
Launching the installer for U.S. Internet's Buffet software gives you Figure 3-92. This installer was built using Aladdin's InstallerMaker software. Choosing the Custom button brings up a collection of individual items for installation just like in the Apple installer as shown in Figure 3-93. The Apple and Aladdin installers may look different, but the buttons and functions are similar. You will find these same similarities in most other installers you encounter.
Install the following:

**Standard Install**

- Applications Only
- Network Components Only
- MacPPP 2.0.1 Only
- FreePPP 1.0.5 Only

This will install everything necessary to get up and going on the Internet, including the applications and network components. Most users will want this option.

Installation requires: 11211K

---

**Buffet Installation**

This will install all the files and applications you need to get up and going on the Internet.

Installation requires: 11211K

---

*Figure 3-92: U.S. Internet Buffet Installer Display*

*Figure 3-93: Apple Installer Custom Display*
CHAPTER 3: FINDER & MENUS

Basic Dialog and Alert Boxes

One final type of window common to the Mac platform is the alert or dialog box. Several common varieties are shown in Figure 3-94. These boxes appear when user input is needed or an error needs to be acknowledged.

![Typical Alert or Dialog Box](image)

**Figure 3-94: Typical Alert or Dialog Box**
Generally the Mac will be as helpful as it can be when presenting you with options. Whenever one of the buttons on a Mac dialog window is highlighted like the one is in Figure 3-95, it can be selected by pressing the return key. Remembering this little step can save you time and lets you keep your fingers on the keys.

Figure 3-95: Mac dialog window with Button Highlighted

Another common dialog box shortcut is the tab key. Using the tab key, you can move quickly from one text box within a dialog to the next. Look at the Print window in Figure 3-96. By using the tab key, you can jump instantly from the Copies: option to the From: and To: options. This rule generally applies to dialogs in all applications and control panels.

Figure 3-96: Print Window Display
start up & the system folder

WHEN YOU TURN ON YOUR MAC, IT IS COMPLETELY MINDLESS. The instructions for everything from how to respond to the mouse to what to put on the screen are missing. The Mac scurries around and finds the information it needs in several places. This is called the start-up process. The bulk of the instructions your Mac loads at this time comes from the System Folder. That's the heart of your Mac. You will find the System Folder located on your hard drive. This is where the Mac finds its System and Finder software along with the control panels and extensions. Without the System Folder, nothing happens when you startup. Inside the System Folder are all of your Mac's settings and most of the settings for your other software as well. It is the most important folder on your hard drive.

Startup

You might say that your Mac gains all of its distinctive character and flavor at startup. Startup occurs when your Mac is first turned on. It is the process by which your Mac checks out all of its various hardware and software, loads the System and Finder, and adds any extensions you may have installed. This is called booting your computer on most other machines such as PC compatibles or UNIX boxes. In the Mac lexicon you don't boot your machine, you startup.
This startup process occurs in an exact order that you can use to track down conflicts and problems. In Chapter 6—Troubleshooting, you’ll see how knowing this startup sequence can help you find a troublesome piece of hardware or a meddlesome extension. This order begins with your Mac’s built-in ROMs and finishes with anything you have in your Mac’s Startup Items folder. Along the way, your Mac checks the hardware and software for problems and lets you know of any trouble.

The first sound you hear when you power up your Mac is the startup chime. This little musical celebration of startup differs among the various Mac models. It began with a simple beep on the earliest Macs and continues today with a progressively more complex collection of digitized chords, depending on the machine you have. No matter what musical salute your Mac starts with, it comes from the same place, your Mac’s ROMs.

**ROMs**

The acronym *ROM* may seem intimidating and foreboding, but it is actually pretty easy to understand and has been around in the computer world a long, long time. It stands for *read-only memory*. Your Mac’s ROM chips contain information your Mac reads at startup, beginning with startup chime. After that the ROMs begin an internal check of your Mac’s hardware. They make sure everything from your keyboard to the RAM is working.

Unlike RAM (random-access memory), ROM can never be changed, so the instructions your Mac first shipped with are the only ones it has. Luckily, your Mac is smart enough to update itself when it begins the next phase of the startup process. Your System actually tells the Mac to ignore parts of its ROMS that are out of date. Of course, your Mac has to find a System Folder to load the *System file*. 
CHAPTER 4: STARTUP & THE SYSTEM FOLDER

System File

Your Mac looks for the System file in System Folder, which is located on one of the drives attached to your Mac. This drive is called the Startup Disk. Usually this is the Mac's original hard drive, but that wasn't and sometimes still isn't the case. All Macs used to start up from 400K floppies shown in Figure 4-1. That would be 40 percent of a single megabyte for the entire Mac system. You can still start up from a floppy in an emergency, but CD-ROMs are becoming the more common standard for emergency startup. Floppy disks simply don't have enough capacity.

![Figure 4-1: 400K Floppy Dialog](image)

Remembering its earliest days, the Mac starts searching for a System Folder at the internal floppy disk drive and then any external floppy drive that may be present. If it finds a Norton Emergency Disk or a Disk Tools disk, then the Mac starts from that. Next, your Mac checks the Startup Disk you have selected using the Startup Disk control panel shown in Figure 4-2 and discussed in Chapter 3. If it finds no System there, it tries the disk at SCSI (Small Computer System Interface) ID 0 inside your Mac.

![Figure 4-2: Startup Disk Control Panel](image)
Next your Mac checks SCSI IDs in reverse order from six through one looking for a System Folder. See Chapter 12 for more on SCSI and your hard drive.

If your Mac still hasn't found a System Folder, it will check the drive at SCSI ID 0 one more time and then wait for you to insert a disk. While it waits, your Mac displays the icon of a floppy disk with a blinking question mark on it, as shown in Figure 4-3. This is your cue to find something for the Mac to finish booting from. Of course, your Mac usually finds the System Folder quickly and begins to load the software it needs to run. If your Mac gets past this point, then most likely you are home free. The Mac will finish startup on its own. Up until this point, though, your Mac has dealt mostly with hardware, and many things could have gone wrong.

![Figure 4-3: System Folder Search Display](image)

**Bad News**

If things don’t go well with the hardware, your Mac will let you know. We’ve already mentioned the floppy disk icon with the flashing question mark, definitely a sign of trouble. You may want to check out Chapter 6–Troubleshooting and Chapter 14–Disaster Recovery for more tips and clues to what’s happening. The cause could be a drive failure of some sort, or you may not have turned on the external drive you normally boot from.
This computer may not have been shut down properly the last time it was used. To turn off this computer, always press the Power key on the keyboard.

Figure 4-4: Mac Trouble Message Display

Another Mac trouble sign is the message displayed in Figure 4-4. Although not a sign of serious trouble, it may mean that some changes didn’t get saved when you last shut down. It also could mean that the Mac crashed without being shut down or that whoever used it last simply turned it off without shutting down. Either way, the Mac knows. When you shut down properly, the Mac sets a tiny software flag to remind itself that things were OK last time. When you simply flip the machine off, unplug it, or crash and are forced to restart, this flag isn’t there. The Mac takes extra time to carefully check the disk for errors or damage before completing startup.

The most dreaded startup error is the Sad Mac shown in Figure 4-5. In fact, this Mac looks more than a little depressed: it looks downright dead. Theoretically, those numbers beneath it tell you what went wrong when the Mac ran its internal diagnostics, but there really is no where for you to look up what those numbers mean outside of a full engineering technical reference. In practice, when you get one of these error messages there are only a handful of things you can do about them anyway. We’ll point you
in the right direction to solve this type of problem in Chapter 6—Troubleshooting and Chapter 14—Disaster Recovery. The basic fixes for a Sad Mac problem range from replacing components inside your Mac to reinstalling your RAM.

So how do you find those #@%$ error codes anyway? If you have ever gotten the Sad Mac icon at startup, your initial shock was probably transformed into dismay when you tried to find out what it means. Error codes just don't get mentioned in any of your manuals or most of the books on the market. The fact is, a Sad Mac is rare enough that there isn't much demand for specifics. You are just expected to take the machine down to the shop when you get this error message. To find out more about these error codes yourself, go to Apple's Technical Information Library at til.info.apple.com on the World Wide Web and enter a search for "Sad Mac error codes" as shown in Figure 4-6. You will be served up the very latest list of these codes and their highly technical meanings.

In plain English, here are a few of the most common:

```
xxxx0001
xxxxxxxxx
```

ROM woes! Your Mac thinks something is wrong.

*Figure 4-6: Sad Mac Error Codes*
with the ROM chips inside. Try restarting, check out Chapters 6 and 14, and if the problem persists, face facts. It's dead, Jim. Take it down to your local Mac repair shop.

RAM failure! OK, any of these codes probably isn’t a sign of serious trouble. You were just adding RAM, right? This code means that one of the chips is bad or improperly seated. Try reseating the RAM chips even if you hadn’t been messing around in your Mac. They could be dirty, loose, or just plain dead. If you can’t figure it out on your own or are nervous about cracking the case, head down to that Mac repair shop.

ADB disaster! This means there is a problem with the chip that controls your keyboard and mouse. Make sure everything is plugged in and in good working order. Like the other examples, it may be time for a visit to the shop.

CSI problem! This means there is a problem with your SCSI chip in the computer. Try unplugging everything and if that doesn’t work, get ready to go you-know-where.

Floppy error! The IWM chip failed on your motherboard. It's time for a visit to the
Almost all other codes are caused by software problems, but they could relate to PCI or NuBus cards as well. Look to Chapter 6—Troubleshooting for more information on how to figure out and maybe even fix what's wrong.

Your Mac can crash almost instantly before it even has a chance to display a Sad Mac icon. On these occasions it uses something ominously known as "the chimes of death" to tell you trouble is afoot. On the Mac Quadra, Centris, or Duo Dock line, the chimes of death are the first few notes of the Twilight Zone theme. On the Power Macs, you are alerted to an error with the sound of a truly horrific skidding car crash. Again, the reasons will vary. Rest assured that these errors are very rare; look to Chapters 6 and 14 if you encounter one.

**Enablers**

After finding the System Folder, the Mac's next order of business is to load any system enablers it may need. If you are running Mac OS 8, then you probably don't need any, yet. System enablers tell your Mac about any new hardware features it may have that aren't covered by the regular system software. If you are running an older version of the System software, then you may need a special enabler for your machine. See the adjoining sidebar for more details on what enablers are covered by what system software.
If you are running Mac OS 8, then you probably don't need to worry about enablers at all, because you already have any enablers you need. Enabler files tell your machine how to behave and find such things as the SCSI controller or video ports. They look like the file shown in Figure 4-7. If you have one and don't need it, keeping it won't hurt anything.

Of course, if you are resurrecting an older machine or using older System software, you may need to deal with them. Below is a list of the enablers needed by machines on older versions of the System. It is possible for your Mac to be too new to start up from an older System.

### For System 7.1:

<table>
<thead>
<tr>
<th>Enabler</th>
<th>Machines</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Ilvi &amp; Ilvx</td>
</tr>
<tr>
<td>003</td>
<td>LC 520, 550</td>
</tr>
<tr>
<td>040</td>
<td>Centris &amp; Quadra 610, 650, 800</td>
</tr>
<tr>
<td>065</td>
<td>LC 475, 575 &amp; Quadra 605</td>
</tr>
<tr>
<td>088</td>
<td>Centris &amp; Quadra 660 &amp; 840 AV</td>
</tr>
<tr>
<td>131</td>
<td>PowerBook 160, 165c, 180, 180c</td>
</tr>
<tr>
<td>304</td>
<td>Performa 600</td>
</tr>
<tr>
<td>308</td>
<td>Performa 450, 460 - 467</td>
</tr>
<tr>
<td>332</td>
<td>Performa 550 &amp; 560</td>
</tr>
<tr>
<td>System Enabler 364</td>
<td>Performa 475, 476, 575, &amp; 578</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>System Enabler 401</td>
<td>Color Classic</td>
</tr>
<tr>
<td>System Enabler 403</td>
<td>LC 520 &amp; 550</td>
</tr>
<tr>
<td>System Enabler 404</td>
<td>Macintosh TV</td>
</tr>
<tr>
<td>System Enabler 406</td>
<td>Performa 630</td>
</tr>
<tr>
<td>Powerbook 500 Series Enabler</td>
<td>Powerbook 520, 520c, 540, 540c</td>
</tr>
<tr>
<td>Powerbook Duo Enabler</td>
<td>Powerbook Duo 210 - 280c</td>
</tr>
<tr>
<td>PowerPC Enabler</td>
<td>Mac 6100, 7100, &amp; 8100</td>
</tr>
<tr>
<td>PowerPC Upgrade Card Enabler</td>
<td>PowerPC Upgrade Card</td>
</tr>
</tbody>
</table>

System 7.5 makes all of these enablers obsolete. You don’t need them since they are rolled in the System file itself. Of course, there are a few machines that need enablers with System 7.5.

<table>
<thead>
<tr>
<th>System Enabler 406</th>
<th>Mac 5200 &amp; Performa 6200</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Enabler 701</td>
<td>Mac 7200, 7500, 8500 &amp; 9500</td>
</tr>
<tr>
<td>Powerbook 5300/2300/190 Enabler</td>
<td>Powerbook 5300, 2300, &amp; 190</td>
</tr>
<tr>
<td>PowerPC Enabler</td>
<td>Mac 6100/66, 7100/80, 8100/100, 8100/110</td>
</tr>
</tbody>
</table>
Startup Screens and Movies

Your Mac finishes loading the basic System at this point and starts looking around for extras such as a customized StartupScreen or StartupMovie for your Mac. You can create your own by placing PICT or QuickTime files named StartupScreen or Startup Movie in your System Folder as shown in Figure 4-8. They are actually easy to make and add some personalization to the entire startup sequence. Just follow these simple instructions:

To make a Startup Screen:
1. Take any graphic and save it in PICT format.
   (See Chapter 19–Graphics for more on graphic file types.)
2. Name the file StartupScreen (all one word) as shown.
3. Place file into your System Folder.
4. Watch for your new StartupScreen at startup.
To make a Startup Movie:
1. Save any movie file in QuickTime format. (Again, we talk more about this topic later. See Chapter 20–Multimedia, Movies, & Sound.)
2. Rename the file Startup Screen or Movie (two words) as shown.
3. Place file in your System Folder.
4. Watch for your film during the next startup.

The Startup Screen displays right after any enablers have run but before your Mac gets to extensions. The Startup Movie waits until QuickTime loads to begin, then halts startup while it plays. You can cancel a Startup Movie by typing `+` after the movie starts. Like TV shows, Startup Movies can get tedious as they enter into the 100th rerun.

**Extension**

After playtime is over, your Mac gets back to business. It launches a bunch of tiny programs called *extensions*. They reside in your Extensions folder as shown in Figure 4-9. These get loaded into memory at startup and then stay there all the time. Extensions modify your system’s behavior or provide resources other applications will need later.

If you’ve ever turned on a Mac, you’ve probably noticed these extensions as they appeared across the bottom of the screen. Some common ones are QuickTime, Speech Manager, EtherTalk, and about a dozen Open Transport files. See Chapter 7–Managing Control Panels, Extensions, & Accessories for a more comprehensive discussion and review of these important files.

The Mac runs through these extensions in alphabetical order. It loads only the files that actually are extensions. If you look in your extensions folder, you’ll notice that there are a few files that aren’t really exten-
Extensions. These wait patiently until they are called for. The fact that it does load them in alphabetical order gives you a useful tool for deciding how they load. If you place a space in front of an extension's name, it will jump to the head of the line at startup. In the Mac's alphabet, a blank space comes before the letter A. This handy trick is discussed further under Chapter 7—Managing Control Panels, Extensions, and Accessories.
Control Panels

The Control Panels load next. Like extensions, they load in alphabetical order. They are kept in the Control Panels folder in your System Folder as shown in Figure 4-10. Usually you use these control panels to control the way your Mac behaves. At startup your Mac loads information it needs from the control panels in the same way it loads extensions. That information stays loaded in memory until you shut off the Mac.

![Control Panels Folder](image)

*Figure 4-10: Control Panels Folder*
Other Startup Items

In addition to extensions and control panels, your Mac loads information from other parts of your System Folder. After it loads control panels, the Mac looks for any loose items to be loaded in the System Folder. These could include loose extensions or control panels in the System Folder as well. Again, the Mac does this alphabetically.
The Mac launches the Finder at this point. As you already know from Chapter 3—Finder & Menus, the Finder gives you that Mac look and feel, from the icons to the folders and windows. Finally, the Mac looks into the Startup Items folder shown in Figure 4-11 and launches any applications or aliases it finds there. Its sister folder, Shutdown Items, behaves in a similar fashion, launching any applications it contains at system shutdown.

You can change the way your Mac starts up with a few special key combinations. You may know a few of these already. The others range from occasionally useful to marginally bizarre. Just hold these keys down at or during startup:

* This will force your Mac to boot from the CD-ROM. This is a useful trick when you don't want to boot from the hard drive. Reasons for this range from running Disk First Aid to checking for viruses.

* This key lets you turn off virtual memory for a single session, from startup to shutdown. This is a handy trick when you have software that needs virtual memory off to do its thing but you don't want to leave it off all the time. The next time you start up, virtual memory will be back and unchanged.

* Getting sick of that startup movie? This key combination cancels the movie.
You can force an AV-model Mac to use the television as a monitor with this key combination.

This key combo rebuilds the desktop.

This key combination will force your Mac to skip the internal hard drive during startup. This is a good way to get your Mac to boot from the CD or another drive.

When you need to zap the PRAM, use this key combo. See Chapter 13 for more on your parameter RAM and what it remembers.

Mouse button: Holding down the button on your mouse during startup will force your Mac to eject any floppy disk that may be in the drive.

This key alone will close all your windows at startup. If you want to be greeted with a clean desktop, use it. Otherwise, you will be greeted with whatever clutter of windows you left open at shutdown.

When you hold this key down from startup it shuts off all extensions, control panels, and startup items. Your Mac loads only what it absolutely needs to start up.

If you wait until after the extensions have loaded, you can cancel the launch of any applications in your Startup Items folder with this key.
The System Folder

The soul of your Mac is the System Folder. On most Macs you will find this folder on the internal hard drive as shown in Figure 4-12. Inside the System Folder itself you will find several consistent items shown in Figure 4-13. These include the System file, Finder, Extensions folder, Control Panels folder, and so on.

Figure 4-12: System Folder in Hard Drive Folder

Figure 4-13: Inside System Folder Display
CHAPTER 4: STARTUP & THE SYSTEM FOLDER

Other programs can add extra folders and files to your System Folder. Don’t be surprised if your System Folder looks more like the one in Figure 4-14. These, like the Claris folder, are used by applications as a central storehouse for settings and files the application routinely needs. Look for web browsers such as Netscape or Internet Explorer to add their own folders to your System Folder as well. Even with all of these changes, there are several items that will be in every System Folder.

![System Folder contents](image)

*Figure 4-14: Application Folders in System Folder*
System and Finder Files

The System and Finder files are located in the System Folder. As shown in Figure 4-15, they are loose in the System Folder. Unlike extensions or control panels, they don’t have their own folders. As a rule these files shouldn’t be moved or modified in any way. The System file provides all of the background information your Mac needs at startup, and the Finder handles the Mac’s interactions with you, the user. If you double-click the System file, you’ll see something similar to Figure 4-16. Those files are the keyboard layouts for different languages and the system alert sounds. In fact, you can take any sound in the system sound format and add it to your alert sounds in the System file by placing it here. These are those sound files you can play by simply double-clicking them. See Chapter 20 for more information on sound.

![Figure 4-15: System and Finder Files in System Folder](image)

Strays

There are several items that can only be described as strays. A few of these files are shown in Figure 4-17. They are left in the System Folder by programs and applications such as Notepad or the Scrapbook. These files generally are harmless. If you recognize one and know you are not
CHAPTER 4: STARTUP & THE SYSTEM FOLDER

Figure 4-16: Multi-language Keyboard Layouts

Figure 4-17: Stray Files Display
using the application that created it, you can save some storage space by throwing it in the trash. Other than that, ignore them. They belong to applications that know more about how to use them than you do.

Apple Menu Items

The Apple Menu Items folder is one of your most powerful tools. Anything you put in it appears under the Apple Menu in the upper-left corner of your Finder. One useful trick is to place in this folder aliases of files you use often. When you need them, they are available from the Apple Menu no matter what program you are in.

This is also the place for little extras that used to be called Desk Accessories. Before System 7 you could install special programs called desk accessories only in the Apple Menu, and you needed a program called the Font D/A Mover to do it. Luckily those complex days are passed, but several tiny programs still lay claim to the title Desk Accessory. The Calculator or the more macho Graphing Calculator are common desk accessories found in the Apple Menu. You may have others such as Scrapbook or Notepad.

Control Panels

The contents of the Control Panels folder shown in Figure 4-18 are from a clean install of Mac OS 8. Control panels load at startup and can be used to change
settings on your Mac. Typically they will control only one set of related features such as memory, as shown in the Memory control panel in Figure 4-19.

Occasionally you will need to disable control panels to track down a conflict. You can use one of the various extension managers discussed in Chapter 7 or you can disable them by hand. You do that by removing them from the Control Panels folder, but don’t just leave them loose in the System Folder. As you saw earlier in the chapter, your Mac loads any loose extensions or control panels it finds in the System Folder. To keep your Mac from seeing these files, hide them in a new folder. Just create a new folder + (or New Folder from the File Menu) and name it something logical like Disabled Control Panels. Place any control panels you want to disable into it. Follow this same procedure to disable extensions.
Extensions

Your Extensions folder is very much like the Control Panels folder. As you can see in Figure 4-20, this folder attracts bunches of arcane and unidentifiable files. These files are placed there when you install software. Since the extensions load at startup, they are a great way for an application to make a global change in your Mac environment or make itself permanently available in RAM. Like control panels above, extensions sometimes need to be disabled manually. You can use the same manual procedure described above, or you can follow the more detailed instructions in Chapter 7-Managing Control Panels, Extensions, & Accessories.

Figure 4-20: Extensions Folder

Preferences

This is the most cluttered piece of real estate on any Mac. You can almost expect that every program you have ever run left its mark in the Preferences folder. Look at Figure 4-21. It simply looks crowded. These files remember application settings, serial numbers, and other informa-
tion. Even the smallest shareware program is likely to create some sort of preference file. If you know a program is no longer on your Mac, then toss the corresponding preference files and save some space. This is discussed further in Chapter 13—Preventive Maintenance.

**Fonts**

The Fonts folder is one of the more visited folders in the System Folder. As the name suggests and Figure 4-22 shows, it is full of fonts. Fonts are discussed at length under Chapter 8—Fonts. The reason the Fonts folder sees so much traffic is that new fonts are easy to install. You can find them on shareware disks and on the Internet in abundance. You simply drag the font files from the CD-ROM, floppy disk, or wherever they went...
when you downloaded them, to the System Folder. Your Mac will put your fonts where they need to be.

The fonts in your Fonts folder are also bundled into suitcases as shown in Figure 4-23. The suitcase in this case contains the screen fonts for Zapf
Dingbats while the ZaphDin icon with the large A on it is the PostScript Type 1 printer font. Figure 4-24 shows you the most recent addition to the Macintosh family of system fonts, Charcoal. This font is a TrueType font and does not need a corresponding screen font to appear in your applications. To learn more about any of these terms, see Chapter 8—Fonts.

**Shutdown Items and Startup Items**

These two folders contain files that launch when you start up or shut down your Mac. Just drop an application or an alias into one of these folders and your program will run at the proper time. One use of this trick is to create a simple startup or shutdown sound by placing the system sound file in one of these folders. Another nice use of the Startup Items folder is to launch your email program or a virus checker. AppleScripts will also launch from these folders, making it possible to automate a series of tasks each time you start up or shut down the Mac.
Previous System Software

The Mac has been around since 1984. Since that time the System has grown more powerful while maintaining a great deal of backward compatability. From that first system in 1984 to the present, here are a few milestones. Generally these will come with whole numbers, but occasionally even an incremental increase like System 7.1 will have something worth mentioning here.

System 1.0

System 1.0 arrived with the Mac 128. At 216k, the System Folder on one of these early machines would hardly be considered a storage hog by today's standards. Even so, consider that you had only one 400K floppy disk to boot from. Try to imagine a 540-megabyte System Folder on your 1-gig hard drive!

The first upgrade came just four months later, and System 1.1 squashed a few bugs and hastened that most loathed process on the early Mac, copying files. With only one floppy disk, you had to let the Mac read a little data into memory, then swap disks and let it write a little more. This frustrating dance created a fairly large market for applications that could fit on a single disk with the System. It saved you the effort of having to swap disks. There were no Shutdown or New Folder commands either. To create a new folder, you simply used the empty folder that was always on the disk and a new empty one would appear. To shut down, you flipped the machine off.

System 2.0

System 2.0 lasted from early 1985 until January 1986. Its biggest advance was the appearance of the Choose Printer desk accessory. This was a proto-Chooser similar to the one under your Apple Menu right now.
System 3.0

Introduced with the Mac Plus in January 1986, System 3.0 and its upgrades fixed bugs and continued to refine the Mac environment. The biggest advance was the introduction of the Hierarchical File System, or HFS. This meant that files could actually be located inside folders. Under the Macintosh File System used previously, occasional mishaps could result in all of the folders disappearing. The result was a disk full of folderless files.

System 4.0

System 4.0 got its big claim to fame with the introduction of MultiFinder in 1988. MultiFinder worked similarly to your Finder today in that you could run multiple applications. The friendly menu you are familiar with wasn't hiding under the icon in the top-right corner of your Mac yet, though. Clicking on that application icon immediately switched to the next application. From System 4.0 until the end of the System 6.0 era, the only other advances were steady improvements on existing elements of the Mac OS. The next big change waited for System 7.0.

System 7.0

Introduced in May 1991, System 7.0 set the stage for the Mac OS you see today. First it provided a bunch of folders to organize the ballooning number of items in your System Folder. Until then, your files just sat in the System Folder. The Extensions, Preferences, and Control Panels folders were all born with System 7.0. With System 7.1, the Fonts folder was added. From there, it was only tweaks and updates through System 7.5.
System 7.5 and System 7.6

System 7.5 and System 7.6 were both collections of existing software components and other released software. System 7.5 was released in 1994 and gathered together updates to components such as QuickTime and QuickDraw GX. It also added drag-and-drop to let you launch applications by dropping files on them. System 7.6 arrived in early 1997. It was basically System 7.5 with all of the latest updates and bug fixes bundled together with Apple technologies such as OpenDoc, CyberDog, and Open Transport.

Mac OS 8 - System 8

The biggest complaints about the various flavors of System 7 dealt with PowerPC Macs. The System software ran in emulation mode on the PowerPC machines. This meant that the PowerPC chip had to slow down and pretend to be an older 680x0 machine when dealing with the System. That slowed to a crawl tasks such as disk copying and some network traffic. With Mac OS 8, the Mac community got the native Power Mac System software it had been waiting for. Other advances include limited multithreading, faster file transfers, and a new look.
MAKING THE MAC YOUR OWN IS A STEP EVERY MAC OWNER takes in his or her own way. Sometimes there are no radical changes, just the addition of a few folders and applications over the life of the Mac. Other times, the changes are radical. Bold colors, custom icons, and outrageous desktop pictures can say “My territory; back off” or project an organization’s image as in Figure 5-1. This desktop is almost unidentifiable as a Mac. In addition to this nod to your creative nature, you can make your Mac work environment more useful by putting the things you need closer at hand. In this chapter we look at both kinds of customization.

**Filing Your Work**

One simple action can greatly increase your ability to find what you need when you need it. That action is your filing strategy. It seems that even though the Mac’s inner workings are paperless, they can get more cluttered than the messiest office. Deciding where you will put your work and store it when you aren’t using it is helpful in finding your work later and backing it up. You can also use a few finder tricks to speed up your work.
CHAPTER 5: ORGANIZING & CUSTOMIZING YOUR WORLD

Figure 5-1: Custom Macintosh Desktop

Folders

Don't shun the lowly folder. As a tool for mastering your Mac, it is indispensable. Use folders to corral wild applications and organize your documents. You'll need to know how to create a new folder and name it, so you might want to brush up on that skill discussed in Chapter 3–Finder and Menus if you are at all unfamiliar with it. If you just need a friendly reminder, you will find the New Folder menu item under the File menu.
Start straightening up around your Mac with those applications. Does your hard drive look like the one in Figure 5-2? If it does, then you probably toss every file you have in there without giving it much thought. Another bad habit is to constantly choose your hard drive as the destination when you install new software without ever specifying a folder. Pretty soon, all those files pile up.

Figure 5-2: Cluttered Desktop
First, take control of that window and change it to a list by choosing the As List menu item under the View menu. You should see Figure 5-3 in place of the previously unruly mob. Create a new folder and name it Applications. Now go through that mess on your hard drive and drag every loose application to the new Applications folder. You can even get creative and segregate your graphic applications from your games and distractions. Figure 5-4 shows you a tamed hard drive with all applications gathered into one place.

You can do the same thing with documents. Two good strategies are gathering them by client or project and gathering them by type. Right now, where do you save your files when you are through with them? If you never give it much thought, you may be saving them into the same folder as the application that created them. The desktop is another favorite place to dump saved files. Both practices can lead to inefficiency and confusion.
Consider this: in Chapter 13 and elsewhere you will be urged to back-up your hard drive. This means that you'll be making a copy of your hard drive's contents and storing it elsewhere. This helps you recover from disasters as diverse as hard disk failure, theft, or fire. You can easily refresh your hard drive with an archival tool as shown in Figure 5-5. If you have your documents scattered all over the hard disk, then you
have to back up the entire drive to protect all of your work. Get organized! If you put your documents in one place, then you can archive just that folder or collection of folders, saving time and storage. If it is easier to do, then you'll do it more often. If you do it more often, then you are better protected.

If you aren't a heavy computer user, then maybe a single folder labeled Documents like the one in Figure 5-6 would be enough. Simply select that folder when saving all of your documents as shown in Figure 5-7 and you will have all of your work in one place. You can even tell your Mac to save everything to a single Documents folder from the General Controls control panel. This makes it very easy to backup this single folder once a week, once a month, or even once a day if it makes you feel more secure. A similar strategy is to create a Documents folder for each application. This keeps your documents separated by file type but makes them easy to roundup at archive time.

Figure 5-6: Document Folders
For a busy, project-oriented workplace, grouping your documents by client or project is probably the best way to go. For example, look at the folder for this book in Figure 5-8. Notice how each chapter gets its own folder. That makes it easy to keep the notes, illustrations, and text all in one place. Try dividing your documents by projects and clients as well.
As an active freelance writer, I keep a "Writing and Projects" folder on my Mac. This folder is further divided into "Pitching" and "Sold" sections. This practice lets me work on an idea until I sell it, then move it over to a client folder where I can finish it up. I archive this folder once a week to make sure I don't lose any work. I can also pull a copy of just the "Pitching" folder over to my portable if I plan to go to the library to do research. For me, this works well. Look for ways to streamline or organize your own documents into convenient divisions for your business.—Sandy Clark

Aliases

The alias is one of the most useful features on the Mac. Combine it with the folders we've already discussed and you end up with a powerful duo for organizing your world. Figure 5-9 shows you an application and its alias. To make an alias for any Mac file, drive, folder, document, or application, simply select the item with a single mouse click and choose Make Alias from the File menu. You can then put the alias anywhere and it will act like the original file. The difference is that the alias is just a pointer and doesn't take up nearly as much space as the original file, as shown by the Get Info boxes in Figure 5-10.

Figure 5-9: Sample Application and Alias
You can create an alias for any icon by holding down the `cmd` and `option` keys when you drag. If you select an alias and hold down the `control` key while you click on it, you can bring up a contextual menu that includes the item Show Original. You will find this same option under the File menu when you have an alias selected. Choosing it takes you to the original folder, application, or other file from which you created the alias.
You can drag-and-drop files onto an application’s alias to open them in that application. You can make an alias of a folder, which will let you save files directly into the original folder it represents. You can make an alias of a network connection, and the alias will open that server for you when you double-click it. Aliases are just plain handy little placeholders for the original files.

PC users running Windows 95 or Windows NT have their own aliases called shortcuts like the one shown in Figure 5-11. The small arrow at the bottom of the icon indicates that the icon represents a shortcut and not an actual file. The underlined file name shows that this PC is running Microsoft Explorer 4.0, which turns the shortcut into a hyperlink accessible with a single click like a World Wide Web object. These PC shortcuts aren’t compatible with the Macintosh, but they behave in much the same way.

Creating a shortcut is as easy as creating a Macintosh alias. You simply display the name of the file for which you want a shortcut, using My Computer or the Windows or NT Explorer, then right-drag the file name where you want the shortcut to appear. Right-drag means hold down the right-most mouse button while pointing to the file name, then drag the name where you want the shortcut to be. In most cases this will probably be to the Desktop, but you can create shortcuts inside any Windows folder as well. Instead of immediately creating the shortcut, Windows pops up a short menu asking whether you want to copy the file to the new location, move the file to the new location, or simply create a shortcut for it. When you choose Shortcut, the icon with the shortcut arrow is created.

As with aliases, you can drag a file onto a Windows shortcut and the application will open with the file in it. In fact, you can create shortcuts for files as well as applications and you can drop the shortcut for a file onto the shortcut for its parent application, and that works too.
Shortcuts can also be folders. When you open a folder shortcut you see the contents of that folder in a pop-up window, along with any icons associated with the objects in the folder. If you drag a file’s icon into the folder shortcut, the file is actually copied into the folder represented by the folder shortcut.

If you move an application or data file after the shortcut has been created, there will be a short delay when you try to access it. Windows won’t be able to find it at the original location, of course, so a search program is loaded. All attached disk drives—including network drives—are searched for the missing file. When the file is found, the shortcut definition is updated to point to the new location.

One more thing. You can learn all about a particular shortcut by right-clicking it and choosing Properties from the pop-up menu.

Placing aliases of servers and often-used programs on your desktop is a great way to make them available quickly. The aliases in Figure 5-12 would give you quick access to your QuickTake camera, PPP control panel, or an attached server. If you have resources you use often, a handy desktop alias can save you a lot of time. You also can make aliases.
of the project folders in the document filing scheme above and leave them on the desktop. That makes it easy to jump in a hurry to a folder several layers down. To place a file into that folder, just drag-and-drop it onto the alias.

Perhaps the best use of aliases is to fashion a handy shortcut to your applications by placing them in the Apple Menu Items folder in your System Folder. This lets you get to them from the Apple menu while you are in almost any program. You can place an alias for each of your major applications into one folder, like the one in Figure 5-13, and place

![Alias Folder]

*Figure 5-13: Alias Folder*
that into the Apple Menu for a very handy collection of applications in one place. Just open this window when you want to drag-and-drop a file on a specific application and save all of the time you would have spent digging down through your folders to find the actual application.

Backup Organization

You shouldn't neglect backing up your data because it seems too complex or takes too much time. You can organize this chore into part of your daily routine and take some of the sting out of it. You may also be running out of space. Archiving seldom-used files is a good, cheap, and usually easy way to free up some hard-drive space. We'll look at a couple of strategies using floppies and Zip disks, but these can also work with a few modifications on Jaz, CD-R, tape, magneto-optical, or any other media you may use.

You have two main reasons to archive information. The first is safety, and we mention it often in this book. If you have only one copy of that report, thesis, term paper, research, blueprint, artwork, and so on, then
you are in very bad shape if anything happens to it. New software may come on corruptible floppy disks, so it is a good idea to have a backup of those disks in case they go bad or become damaged. The second reason to archive is to free up storage space. Your internal Mac hard drive gets a lot of use. It fills up quickly with applications, shareware, and downloads from the net. If you start to feel the pinch, the only thing to do is throw away some items to make space. Of course, you don’t want to throw out the only copy of an installer or application. That’s where archiving comes in.

One of the first things you can do to hasten this little chore along is to just backup what you need. Use the document folder strategies above and backup your work, not every file on the drive. If something really drastic happens, you’ll be reformatting anyway. Take that opportunity to reinstall the applications and then you need only to pull your documents out of an archive.

Organizing the software you own can speed up both finding that software and recovering from a disaster. Use some form of cheap storage to backup your installers. Get in the habit of using ShrinkWrap or some other utility to make disk images of any floppy-based installers you have or any new ones that come into your home. You achieve two things. First, you now have a backup in case the floppies get damaged or go bad. Second, you can build up a library of disk images to reinstall from like the one in Figure 5-15. When you drag-and-drop these disk images on ShrinkWrap, it will mount them all into RAM if enough is available. Figure 5-16 shows you several ShrinkWrap-mounted virtual floppies. It’s as if you had four floppy drives! This can greatly hasten a reinstallation if the software on your hard drive develops trouble.

You can also archive software you don’t use often to Zip disks, floppies, or other media and drag it back to your hard drive only when you need it. If you don’t often find yourself using graphic applications, for example, you can keep those on Zip and just drag them back when a need arises. If you leave their preference files and other support folders in place in your System Folder, then they should behave as if they
never left the hard drive at all. With some applications, this could free up dozens of megabytes of space.

Another timesaver is to organize those backups so that your Mac worries about them and you don't. If you have a lot to backup, or if you want to backup an office full of machines, you can do it

Figure 5-15: Disk Image Library

Figure 5-16: ShrinkWrap-mounted Virtual Floppies
quickly and efficiently from inside a program such as Dantz's Retrospect. From the controls in Figure 5-17, you can set Retrospect to run at specific times, backup specific machines, or even specific folders. Remember to leave a tape in the backup drive and all you have to do is carry an archive off-site once every week or so.

![Retrospect Directory](image)

**Figure 5-17: Retrospect Directory**

## Changing Your Look

As you've already seen in Chapter 3, there is a lot you can customize on your Mac. Buried under the menus at the top of the desktop and on the control panels in your Control Panels folder are dozens of ways you can make the look and feel of your Mac your own. You can place a photo of your grandkids on the desktop, change the borders and sliders on your windows to something more colorful, and even customize the icons for anything on your Mac.
Control Panels

There are several control panels to change the look of your Mac. Alphabetically, the first is the Appearance control panel shown in Figure 5-18. Under the Color options, you can change the color your Mac uses to highlight text. The Sample Text box changes to show you the effect. The Accent Color settings change the progress bars like the ones that appear when you copy a file and the sliders on the side and bottom of your windows.

![Figure 5-18: Appearance Control Panel](image)

By selecting the Options button, you can bring up the selections in Figure 5-19. The controls for the behavior of collapsing windows are located here along with your system font selections. You can choose between the classic Chicago font and the Mac OS 8 Charcoal font. “Systemwide platinum appearance” will update the look of controls systemwide. This gives all of them that Mac OS 8 style.

You have seen the Recent Applications, Documents, and Servers windows under the Apple Menu before. You can change them from the
Apple Menu Options control panel in Figure 5-20. They are controlled
from the Recent Items settings toward the bottom of the control panel.
To turn them off completely, just uncheck the Remember Recently Used
Items checkbox. You can also change the number of items remembered
with the appropriate text boxes. The Submenus setting turns that
option on or off. Submenus are those menus that open automatically
when you move the mouse over a folder in the Apple Menu like the one
in Figure 5-21.
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Got an older version of the System but want to get those hierarchic sub-menus and that platinum look and feel? Don’t fret, you can upgrade your Mac’s look without installing Mac OS 8 with some handy shareware programs such as BeHierarchic in Figure 5-22, or 7Tuner in Figure 5-23.

Figure 5-21: Apple Menu Sub-Menu
BeHierarchic: ($10) After you get used to submenus, it is hard to live without them. BeHierarchic gives your Mac running System 7 submenus worthy of System 7.5. It also lets you organize your Apple Menu Items in new ways and even gives you a desktop folder turning the Apple Menu into a powerful navigator.

Figure 5-22: BeHierarchic Shareware

7Tuner: ($15) You can give that older Mac the OS 8 look without installing OS 8 by using 7Tuner. You can also control many aspects of your desktop from colors to the folder styles and the shapes of the windows.

Figure 5-23: 7Tuner Shareware
You've already met the Control Strip in Figure 5-24. You can control many aspects of the Control Strip's behavior from the Control Strip control panel in Figure 5-25. The Show/Hide settings control whether or not your Control Strip is visible. Use the Hot key to Show/Hide setting to create a key combination that will hide or retrieve your Control Strip on demand. This is a nice touch on small, crowded monitors. You can add or remove modules from the Control Strip by adding or removing the corresponding files from the Control Strip Modules folder in your

![Figure 5-24: Control Strip](image1)

![Figure 5-25: Control Strip Control Panel](image2)
System Folder. As you can see in Figure 5-26, each module has its own corresponding file. Look for new modules in shareware collections and on the Internet. One last tip: To move the Control Strip to a new location on the desktop, just hold down the option key while dragging it with the mouse. You can place it anywhere on the left or right side of the desktop.

![Figure 5-26: Control Strip Module Files](image)

The next control panel is the Date & Time control panel in Figure 5-27. You can set all aspects of your time and date functions from here as well as activate the Menubar Clock options. From these options in Figure 5-28, you can control the hourly chime, look of the display, font, and other options.
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Figure 5-27: Date & Time Control Panel

Figure 5-28: MenuBar Clock Options
Mac OS 8 gives you the Desktop Pictures control panel for adding some style and personality to your desktop. The control panel in Figure 5-29 shows you the Pattern options. The teddy bears shown here are just one of dozens of patterns that ship with OS 8. You can find many, many more out on the Internet. From the Picture options in Figure 5-30, you can choose a picture for the desktop instead. You can position or tile it to fill the screen or just occupy a portion of it. This is a good way to put pictures of the kids, your pet, or a corporate logo on the desktop.

Figure 5-29 Control Panel Pattern Options
You can customize several handy items from the General Controls control panel in Figure 5-31. From the Desktop settings, you can tell the Mac what to do with the Finder when you are in another application or activate the Launcher at startup. What is the Launcher? Imagine a super-simplified user interface for the techno-terrified. You will find it in the Control Panels folder as well. The Launcher in Figure 5-32 is just a window full of buttons. You can add more buttons to it by dragging the desired icon to the Launcher. Use the Launcher and the Show Launcher at System Startup option to create a simple palette of options for a computer-shy relative or to limit the choices in a teaching or lab environment.
Other controls on the General Controls control panel include settings for a Documents folder. If you want to go with the single Documents folder mentioned earlier, then this is a great way to simplify it. The most common setting is Last Folder Used in the Application setting. This lets each application remember the last folder you used with it and return you there when you choose the Save command.
The Map control panel shown in Figure 5-33 lets you designate your city and time zone. The system clock and other programs such as Redshift from Maris software use this information. Redshift is an astronomy program that will, among other things, use the Map control panel to generate a starmap for your specific night's sky.

From the Numbers control panel shown in Figure 5-34, you set the style of numbering and currency in use in your area. Planning to take your Powerbook to the Netherlands? Go native.
Finally, from the Text control panel in Figure 5-35 you can change a wealth of behaviors based on the native language of the country you select. The basic choices are shown in the pop-up menu in Figure 5-36. You can add others from Apple, which generally customizes its machines for the native market where they are sold.

![Text Control Panel](image)

*Figure 5-35: Text Control Panel*

![Text Control Panel Popup Menu](image)

*Figure 5-36: Text Control Panel Popup Menu*
Icons and Desktop

Customizing the look of your Mac out on the Desktop is one of the easiest things you can do to personalize your space. You can change the icons used by your files, customize the behavior of windows, and change how they open and display their contents.

Look at the humble icons in Figure 5-37 first. We recognize the Mac shorthand for hard drive or network connection at a glance. You can personalize these or any other icon easily from the file's Get Info box. Just cut and paste new icons from one info box to another. Select the item you want to change with a single mouse click and type `⌘` + `T` or select Get Info from the File menu. Notice the icon in the top-left corner

![Figure 5-37: Typical Macintosh Icons](image)

![Figure 5-38: Info Box with Icon](image)
of the Info box as shown in Figure 5-38. When you click on it, you select it as shown in Figure 5-39. You can then use the Edit menu or the keyboard shortcuts to copy that icon or paste down a new one.

![Shadow Hill Icon](image)

*Figure 5-39: Info Box Icon Selected*

There are thousands of customized icons floating around out there for you to pick from. Look for new ones on shareware disks or the Internet. Generally, custom icons will be presented as empty documents with custom icons that you can just cut and paste into new homes. Figure 5-40 shows a large collection of custom icons. If you wanted to copy one of

![Banzai Icons](image)

*Figure 5-40: Sample Custom Icons*
them, just select the icon you want from the info box as shown in Figure 5-41 and paste it into its new home from Figure 5-39 above. You will now have a custom icon for your hard drive as shown in Figure 5-42. That’s all there is to it, simple cut and paste.

To make a new icon, simply work on a 32-pixel by 32-pixel canvas and paste your finished product onto the file of your choice. See Chapter 19
for a quick tour of your Mac's graphics abilities and an example of icon construction. If you don't have time to build your own, check out www.iconfactory.com. As shown in Figure 5-43, it has an icon for every desktop. It can also point you toward other icon sites out on the web.
Icons aren't the only malleable objects on your desktop. You can change the size and style of the font used across the entire desktop from the Preferences window in the Edit menu. You can also see from Figure 5-44 that you can change the icon spacing or behavior of spring-loaded folders. You can customize your Mac's labels as well. Labels let you identify icons with a colored border.

![Preferences Window Showing Changed Icon Spacing](image)

*Figure 5-44: Preferences Window Showing Changed Icon Spacing*

You will find label choices under the contextual menu of any icon as shown in Figure 5-45. You get to contextual menus by holding down the `command` key when you click on an icon.
Windows on your desktop aren't chained to one look or style, either. As you have already seen in Chapter 3, there are several options under the View menu shown in Figure 5-46. You can make a simple window like the one in Figure 5-47 into a pop-up window like the one in Figure 5-48. Windows also remain where you left them when you shut down your Mac. This means you can create a launcherlike palette of buttons out of any window on your
Figure 5-47: Typical Simple Window

Figure 5-48: Simple Window Converted to Pop-up Window
Mac. This is a useful trick for making available at startup a window with simple buttons on it as shown in Figure 5-49. This can be useful for many of the same reasons discussed with the Launcher above.

![Window Converted to Launcher-Like Palette of Buttons](image)

**Figure 5-49: Window Converted to Launcher-Like Palette of Buttons**

### Deeper Changes

There are several technologies that can let you organize your Mac at even deeper levels. First, there is *Publish and Subscribe*, which lets you organize your work into sections that automatically update themselves. There are *macros* in most applications that let you do several things with a single keystroke. You can record multiple actions such as menu selections and mouse movements, then play them back as one command. There are even software programs that let you write macros across several applications. *AppleScript* lets you write scripts that can launch and interact with applications. Finally, with ResEdit you can actually change applications themselves. This even includes the System and Finder files in your System Folder.

**Publish and Subscribe**

With Publish and Subscribe you can link the product of one application called a *publisher* to several other documents. This allows you to combine text from a word processor, graphics from an art program, and tables from a spreadsheet into one intelligent document called a *subscriber*. 
When you change the original data, say, by updating the numbers in a spreadsheet or by revamping the logo art, the changes automatically appear in the subscriber document. Unfortunately, the technology hasn't caught on as well as cut-and-paste or drag-and-drop. As technologies go, it's pretty nifty but moderately difficult. It definitely isn't as easy as cut-and-paste.

In some but not all applications you will find the Publish-and-Subscribe options in the Edit menu like the one from Photoshop shown in Figure 5-50. When you create a logo, spreadsheet, or block of text,
you can turn it into a publisher by selecting it and choosing the Create Publisher command. This command may be buried in a submenu under the Edit menu or it may not exist at all. Some programs simply don't use the Publish-and-Subscribe feature and have no corresponding command in their Edit menu. When you create a publisher, you will see a menu similar to the one in Figure 5-51. Simply name and save your publisher edition. The information in the edition will be updated any time you make changes in the file you are working on.

![Publisher Menu](image)

**Figure 5-51: Publisher Menu**

From another application, you can subscribe to the publisher edition you just created by selecting Subscribe To from an Edit menu such as the one in ClarisWorks shown in Figure 5-52. In this case, the Publish-and-Subscribe commands are located in a submenu. Once you have subscribed to a publisher edition, you will always show the current information in that publisher file. For example, you could track sales or other data in a spreadsheet and automatically update that information in

![Subscribe Menu](image)

**Figure 5-52: ClarisWorks Subscribe to Menu**
another document such as a weekly report written in another application.

The best examples and most common use of Publish-and-Subscribe are creating newsletters and such simple reoccurring documents as memos. Take the newsletter in Figure 5-53 as an example. It is made up
of one subscriber and two publishers. The newsletter itself includes the masthead and first two articles. The chart in the middle of the newsletter and the last article are actually subscribers to outside documents shown in Figure 5-54. Whenever Bob writes a new rant or the sales-and-work numbers are updated, the changes appear in the newsletter. You can set publishers to update in several ways, as shown in Figure 5-55. They can be updated when you specify or automatically when you save the publishing document.

Figure 5-54: Chart Inside Newsletter
Macros

The main thrust of organizing your Mac should be to work less or at least to work more efficiently. You shouldn’t have to do a complex series of tasks if your Mac can do them for you. That’s what macros are for. You can preprogram a key combination of your own, just like $+5$ or $+$. Those key combos let you select menu commands without touching a mouse. You can do that for any command and much, much more with macros. You will either use macros inside an application or use one of many macro utilities that work within many programs.

As an example we’ll look at ClarisWorks and its macro commands. Many of the other programs you own probably have their own macros as well. In ClarisWorks the Macros menu is a submenu under your File menu shown in Figure 5-56.
You can choose to play, edit, or record a new macro from here. When you choose to record a new macro, you are presented with the dialog box in Figure 5-57. From there you can assign the macro to a key combination or one of the function keys on your keyboard. You also select which parts of ClarisWorks you want the macro to work in with the check boxes on the right. After you click the Record button, a macro icon shown in Figure 5-58 begins to flash in place of the Apple menu. From this point, on anything you do is recorded into the macro until you select Stop Recording from the Macros submenu or type the keyboard shortcut `~ + `Shift` + `2 to shut it off. Whatever you recorded will get repeated when you type the key or key combination that you specified.
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Let's say you wanted a macro to type the phrase "The Infamous Bell Witch of Tennessee" in 18-point italic type. Who knows why you would want to do this, but let's say you do.

Go to the Macros submenu under the File menu and choose Record Macro as shown in Figure 5-59. For this example we'll name the macro "Bell Witch" and have it work in all ClarisWorks environments as shown in Figure 5-60. We will also assign it to the function key F8, but you can

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**Figure 5-59: File Macros Submenu**

**Figure 5-60: ClarisWorks Named Macro**
assign it to any key you like. After clicking the record button, make all of the choices required from the Size and Style menus and then type the phrase. Finally, type $\mathbb{C} + \mathbb{Shift} + \mathbb{F}$ to end recording. Now when you press the F8 key you get the recorded phrase as many times as you like (see Figure 5-61).

You can use macros to record repetitive or complex tasks so you don’t have to repeat them. Our example was very simple, but you can make your macros much more complex. Additionally, you can buy software to let you write macros that work across your entire Mac.

The three best macro scripters are KeyQuencer, OneClick, and QuickKeys. They all let you run a single macro over many programs. They can even automate opening and closing applications.

**KeyQuencer:** ($40) KeyQuencer comes in full-strength and a shareware version, which is shown in Figure 5-62. KeyQuencer’s stand-out features are its stability, documentation, and low memory usage. If you want to download and play with a macro tool right away, grab KeyQuencer from the Binary Software website at www.binarysoft.com/kqmac.html.
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Figure 5-62: KeyQuencer Shareware Version

OneClick: ($70) WestCode's OneClick software is more than just a macro program. It is also a global palette-oriented tool for organizing your Mac. Very easy to learn, OneClick takes you through a quick tour of its functions when you first launch it as shown in Figure 5-63. From there it offers lots of pop-up and embedded help messages to keep you going. The scripting language has its own section on the OneClick control panel shown in Figure 5-64. Scripts become buttons on OneClick's palettes.
Welcome to OneClick

Welcome to an easier, faster, and more intuitive way of working with your Macintosh! OneClick is a "user-interface extension" integrated into the Mac OS that provides customizable buttons for use with all Mac programs. Now you can simplify any task or repetitive action on your Mac to be as easy as a click of the mouse!

OneClick comes with dozens of ready-to-use buttons for popular application programs that will help simplify and automate your work. What's more, with OneClick you can create personal button-based interfaces that are tailored to meet your needs.

Figure 5-63: OneClick Tour Screen

![OneClick Tour Screen](image)

Figure 5-64: OneClick Control Panel

![OneClick Control Panel](image)

```plaintext
OnMouseDown
Variable i inList aDelay theChoice theFile x temp tempList temp
Variable Global hideOthers excludedApps resetTB

aDelay = Ticks + 20

While aDelay > Ticks
  If NOT IsMouseDown
    Button.Update
  If ShiftKey
    theChoice = "Quit"
```
QuicKeys: ($90) QuickKeys from CE Software is just plain easy to use. It comes with a number of prebuilt macros. Macros can be collected and saved into keysets to accomplish specific tasks. Everything is controlled from the QuicKeys menu in Figure 5-65 and the QuickKeys editor in Figure 5-66.

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Figure 5-65: QuicKeys Menu

Figure 5-66: QuicKeys Editor
Sometimes, your best-laid plans can be stopped cold by an error message that wastes your time and slows you down. Your dutiful Mac can be chugging along fine when it crashes or gets switched off by the cleaning lady, or an annoying error message pops onto the screen temporarily halting everything. Whether you are running a macro, fileserver, or some of the home automation discussed later in this chapter, when these disasters strike, your Mac stops cold. There are a few shareware applications out there that can keep you going.

**AutoBoot:** ($20) AutoBoot will automatically restart your Mac after a crash or freeze. Use it to make sure your Mac bounces back after a disaster, even if left unattended.

**Cron:** ($10) Sometimes, you want to do things at certain times - check email while you are at lunch, for example, or bring up Netscape before you arrive in the morning. Cron lets you launch items at different times during the day.

**Okey Dokey Pro:** (Free) When those annoying messages pop up telling you that "Joe has left the network" or some other trivial thing you hadn't counted on has occurred, they can freeze your entire Mac while waiting for an answer. If you aren't there to acknowledge them, your program stops and waits for a mouse-click that will never come. Okey Dokey Pro clicks "OK" for you and saves a screen shot of the message so you can see what went on while you were gone.

**OncePerDay** ($10) Startup items are great. You turn your Mac on in the morning and it checks the mail and brings up Microsoft Word for you. Later though, startup items get annoying. When you have to restart after installing software or because of a crash, you might not want startup items kicking in. OncePerDay lets you keep them under wraps after the first startup. They simply wait patiently until the next day to do their thing again.
AppleScript

Apple also includes a built-in macro language of sorts called *AppleScript*. AppleScript is actually much, much more than just a macro language. Using *Apple* events messages, AppleScript can get programs to talk to each other. It also acts like a programming language letting you incorporate variables and some object-oriented programming. If you aren't inclined to become a programmer, AppleScript can do a passable job of learning by watching as you go through the action you want it to complete for you. This is very similar to the way ClarisWorks behaved in our "Bell Witch" example above, except you can automate actions throughout your Mac, not just in a single application like ClarisWorks.

![Figure 5-67: AppleScript Script Editor](image)
The core of AppleScript is the Script Editor shown in Figure 5-67. You should find it in the AppleScript folder inside the Apple Extras folder that was installed with Mac OS 8. You can record a new script with the Record button or you can type the raw AppleScript commands in the lower window. The Run button will attempt to execute your script, and the Check Syntax button will see if anything will keep your script from compiling. When you compile the script, it becomes a miniature application in its own right, like the scripts in your Automated Tasks folder shown in Figure 5-68 and found under the Apple Menu on your machine.

![Figure 5-68: AppleScript Automated Tasks Folder](image)

The scripts themselves look like those shown in Figure 5-69. The commands they contain are almost English, but not quite. Before you start to pull your hair out, consult your applications and find out what they understand with the Open Dictionary command in the File menu shown in Figure 5-70. When you open an application that understands
on run
    tell application "Finder"
        set theList to selection
        if (count items in theList) = 1 then
            if class of item 1 of theList is application file then
                if name of (info for (theList as alias)) is "Add Alias to Apple Menu" then
                    set theList to {}
                end if
            end if
        end if
    end tell
    MakeAppleAliases(theList)
end run

on open theList
    MakeAppleAliases(theList)
end open

Figure 5-69: Typical AppleScript Script
AppleScript like ClarisWorks you get a dictionary of the AppleScript commands it understands as shown in Figure 5-71.

![ClarisWorks Dictionary](image)

*Figure 5-71: AppleScript Commands in ClarisWorks Dictionary*

AppleScript gives you the ultimate ability to control and tame your Mac. Reading the dictionary gives you a start at understanding AppleScript. To learn more, see *Tao of AppleScript* by Derrick Schneider and check out www.scriptweb.com. ScriptWeb has tons of information on AppleScript and other Macintosh scripting products.

**OpenDoc**

For a while *OpenDoc* was touted as the future of the Mac platform and applications in general by Apple Computer and IBM. OpenDoc lets you organize and customize applications in ways only programmers used to dream of. Instead of buying an entire program, you would just buy *parts*. You would then place these parts into *containers* also called *Live Objects* that become the actual application. You could strip OpenDoc applications apart and use just what you like. For example, if Microsoft
Word's spellcheck really worked for you but you liked the text-editing tools in ClarisWorks, you could just throw those two parts into a container and use them together. It also meant you could create documents that contained sound, movies, pictures, text, numbers, charts, and almost any other form of data. On the other end, if someone wanted to open the document, they didn't need your exact same application. They just needed parts that understood the data. It promised to end proprietary file formats. Unfortunately, in actual practice OpenDoc is about as intuitive and easy to understand as calculus.

Early in 1997 Apple and IBM pulled the plug on OpenDoc and their partnership. This doesn't mean that OpenDoc dies instantly, but it does end the major support that OpenDoc enjoyed. Look for this fruit to wither on the vine. Figure 5-72 shows you a screen from Cyberdog, by far the most popular OpenDoc application. Cyberdog lets you do almost everything there is to do on the Internet from email to the World Wide Web. Since it is an OpenDoc application, it is full of parts you can rearrange and embed in other applications.

Figure 5-72: CyberDog Application Screen
Another prominent OpenDoc application is WAV shown in Figure 5-73. WAV is a word processing application, an OpenDoc Live Object, and it incorporates Cyberdog so it is a complete Internet application as well. You can embed almost any OpenDoc data type into WAV and customize it to do the job you want.

"...I cannot but believe that we stand at the beginning of a new era, the Age of Flight, and that the beginnings of today will be mightily overshadowed by the complete successes of tomorrow."
ResEdit

To really customize an application, you need to crack it open and fiddle with the application's resources. Resources are small bits of data your application uses but doesn't include in the actual program itself. All Mac files and applications have two parts called the resource fork and the data fork. The actual application or information in a file is in the data fork. The resource fork contains everything else that makes up the file. This can include the file and creator type codes already discussed, as well as menus, splash screens, sounds, icons, and other bells and whistles. With the application called ResEdit shown in Figure 5-74, all of your Mac's resources are yours to change.

Although you can change them, you must keep two things in mind. First, never work on an original application. Always make a duplicate as shown in Figure 5-75 and work on that. There are things in your application's resources that you can break. If you do, the program may never work again. Be careful! The second thing to keep in mind is that unless you are a programmer, most of what you will see in ResEdit will probably make little to no sense at all to you. That's ok, it can still be fun to poke around.

Figure 5-74: ResEdit Application Icon

Figure 5-75: Duplicate Application Icons
When you start ResEdit, you are greeted with the smiling Jack-in-the-box shown in Figure 5-76. Clicking on this splash screen sends it away and brings up a familiar Open File dialog box. ResEdit is asking you to open something. For our purposes, let's work on the copy of Freehand 5.5 we made earlier by selecting and opening it as in Figure 5-77.

Figure 5-76: ResEdit Opening Screen

Figure 5-77: Freehand 5.5 Application
When you open an application in ResEdit, you find a bewildering matrix of icons on the screen. These icons shown in Figure 5-78 each represent a kind of resource. Some of them may look cryptic, but if you double-click on the right ones, you can find some surprises. Take the PICT resources in Figure 5-79 for example. Double-clicking on that icon brings up a window full of FreeHand's PICT resource files. These are the graphic elements that make up FreeHand. For a surprise, scroll down to PICT resource 20471. Located right next to FreeHand's startup screen is the secret screen shown in Figure 5-80. Who is this guy anyway?
Figure 5-79: ResEdit PICT Resource Icon

Figure 5-80: FreeHand Secret Startup Screen
OK, so you can go spelunking in your applications, but what about making real changes? Go back to the resources window and double-click on the Menu icon. This lets you fiddle with FreeHand's menus. Want to create your own key combo for a menu item? This is where you do it. Figure 5-81 shows you all of the menus in FreeHand. Double-clicking on the first one gives you access to FreeHand’s Apple Menu items. Give the

![Figure 5-81: FreeHand Menus](image)

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About Freehand menu item a keyboard shortcut by putting a + in the Cmd-Key text box as shown in Figure 5-82, and the corresponding ⌘ + ♦ appears in the menu to the right. Save this copy of FreeHand and launch it, and you will find your new shortcut in the Apple Menu as shown in Figure 5-83. Modifying and customizing menus and fiddling with pictures only scratches the surface of what ResEdit can do. To download your own copy, just go to www.apple.com and search for ResEdit. You will be pointed to one of several download sites, including ftp.info.apple.com/Apple.Support.Area/Apple_SW_Updates/US/Macintosh/Utilities/ shown in Figure 5-84. You might look for Zen and the Art of Resource Editing: The BMUG Guide to ResEdit. This is one of the better books on the market for ResEdit and will reveal all of your Macs deepest secrets.

Figure 5-82: About FreeHand Display

Figure 5-83: New Shortcut in Apple Menu
How about customizing more than your Mac's virtual world? You can wire your entire house into your Mac for an experience that is pure George Jetson. A friend once wired his apartment with X-10 modules he picked up at Radio Shack and tied the whole thing into his modest LC II with 4 megabytes of RAM. How did it work? Pretty well, according to my friend, who used the system to start the coffee and toast in the morning and turn on the porch and living room lights at the house while he drove home from work.

These X-10 modules plug into your outlets and send signals through your house's electrical wiring. These signals can convey information, turn on modules, and control remote devices. For example, there is a module you can bury under your driveway to detect approaching vehicles. Another module barks like a dog when someone approaches and can turn on floodlights or an alarm for you. Still other modules can control your remote control devices like VCR and television. You can even get a module to measure rainfall or one to water the plants. Where do you start learning about this kind of technology? Try the Mac-friendly folks at Sand Hill Engineering on the Internet at www.shed.com. They manufacture the AppleScriptable XTension software that lets your Mac control your home. They
also have online tutorials and "newbie pages" for beginners. You can follow their links to X-10 product manufacturers, other home-automation sites, and more pages on learning and conquering AppleScript.

—Sandy Clark

Just another note on X-10 controls. I was using a lowly 6502-based computer made by Ohio Scientific in the late 1970s to do the same thing. Those X-10 modules have been around even longer than the Macintosh!

—Tom Badgett

You can get hundreds of other commercial and shareware programs to customize your Mac. They range from the useful to the downright silly. A few are listed below. To find more on your own, see the last chapter in this book for more Mac resources such as websites and sources of shareware.

**Holiday Lights:** ($15) This shareware program lets you string holiday lights like the ones in Figure 5-85 all over your Mac. This program doubles as a screensaver, so maybe you can use that as a defense when you are caught with it at work.

*Figure 5-85: Holiday Lights Application*
WorldClock Lite: ($15) WorldClock Lite lets you keep track of the time across the globe and tracks sunrise and moonrise for you as well. Make your Mac a global astronomical timepiece with this shareware improvement on the standard system clock.

Window Monkey: ($20) Window Monkey gives you the ability to stick your open windows into a menu as shown in Figure 5-86. It also lets you place background patterns in your individual windows.

Drag Thing: ($15) You can create floating palettes called docks. Any application or file you drag-and-drop on the dock stays there and floats in the foreground ready to be launched at a click. It even keeps track of the applications you are running and keeps them available for you no matter which program you are in.

Tools for Change

How to find 'em

7tuner: www.macupdate.com - Shareware
BeHierarchic: www.shareware.com - Shareware
Cyberdog: www.apple.com - 408-996-1010
DragThing:  http://hyperarchive.lcs.mit.edu/HyperArchive/Archive/gui/ - Shareware

Holiday Lights:  www.tigertech.com - Shareware
KeyQuencer:  www.binarysoft.com - 800-824-6279
OneClick:  www.westcodesoft.com - 800-448-4250
QuicKeys:  www.cesoft.com - 800-523-7638
WAV:  www.dharbor.com - 801-785-2115
Window Monkey:  www.tigertech.com - Shareware
WorldClock Lite:  www.hourworld.com - Shareware
XTension:  www.shed.com - 407-349-5960
troubleshooting

YOU DON'T HAVE TO GO LOOKING FOR TROUBLE; TROUBLE will find you. It is almost always random, unexpected, and upsetting. You may have no idea where to start on the problem, or you may need tools you don't have on hand. Even if you think you are prepared, the entire problem-solving process can be draining. This chapter focuses on finding solutions to the problem at hand, whatever that may be. For the most part, the advice is general. The tools and tricks mentioned here include some of the ones from Chapters 13 and 14. If your machine is completely down, you'll want to see Chapter 14–Disaster Recovery right away. For basic good habits, see Chapter 13–Preventive Maintenance. For those strange, annoying, and occasional problems, read on.

**General Troubleshooting**

First, a general overview of the job at hand and the tools you use is in order. If you are in the heat of a problem right this second with a deadline looming, take a deep breath, calm down, and jump straight to Common Problems later in this chapter. If you have a moment, learn to get the most from the tools you have. Remember that your brain is more important than any tool you can load onto your Mac. Use your brain, and you can walk right through most troubles.

Troubleshooting is more an art than science in most cases. When you try to find the problem, you are troubleshooting even if all you do is jiggle a few random connectors and reboot. You want to eliminate possible causes of trouble and build up evidence of a probable cause. It helps to keep your head, be prepared, and think like your computer.
CHAPTER 6: TROUBLESHOOTING

Approaching Problems

First, at the risk of sounding like some Eastern mystic or new-age guru, we need to discuss your frame of mind. When your Mac doesn’t do what you want or expect, you will feel betrayed. That’s it in a nutshell. You will become angry, and you may even contemplate hurling something through a window. That’s normal, but it doesn’t help you. Before you try anything, take a moment to clear your head and think the problem through. We’ll discuss some of the questions to ask yourself in just a moment. If you feel real anger and rage, then you are almost useless as a troubleshooter. Some feelings of frustration are normal. This could be as a momentary frown or curse, after which you are fine, but it is not uncommon to encounter an increasing number of overly stressed individuals in direct proximity to a computer. Like automobiles, computers can breed frustration.

If you are operating from beneath a lot of stress or anger, fix that problem first. Take a deep breath. If time permits, get a drink of water, go to lunch, or take some time out. If you don’t even have time for a trip to the water fountain, then try taking 20 long seconds to just close your eyes and clear your mind.

When you are calm, it is time to ask some questions. They are:

**Does the problem reoccur?**—Try again. Restart.

**What does your Mac tell you?**—Read dialogs and error messages.

**What has changed since the computer last worked properly?**—Remove or disable anything new. Try again.

**What could change?**—Think like a Mac. Check settings and cables.

**Is there another way to do it?**—Try a “work around” for now.

The first question is, “Does the problem reoccur?” Some problems are
simply one-time occurrences. Try whatever caused the problem again. If your print job didn’t print, try sending it once more. Try emptying the trash again if it didn’t seem to notice your request the first time. Sometimes things don’t work simply because you did something that you didn’t even notice such as clicking the Cancel button by mistake or moving past the Empty Trash item in the menu before releasing the mouse button. A thousand tiny mistakes could happen. Try it again. As an extension of this question, restart and try again. You may have lost track of the printer or something may have locked up. Troubleshooting after a fresh restart is always recommended since the very act of restarting often solves problems.

Next ask, “What does my Mac tell me?” Dialog boxes such as the one in Figure 6-1 can actually tell you all you need to solve the problem. In this case the problem is solved as soon as AppleTalk is back on. Other dialogs might not give you the solution outright but can still provide you clues such as the one in Figure 6-2. In this case you might try increasing the application’s memory allocation from its Info box. Other alert boxes point to dozens of possible causes. The alert in Figure 6-3 could be caused by everything from incorrect TCP/IP settings to a bad phone line. Take your clues where you can find them.
That operation cannot be completed because there is not enough free memory.
Internal error #1011
MacOS error #0

Figure 6-2: Info Box Memory Display

Host or gateway not responding:

nowhere.loopback.edu

Figure 6-3: Communications Alert Box

If you haven't solved your problem yet, ask, "What has changed?" For example, if you are getting a Sad Mac at startup, did you just change a card or RAM? If so, look there first for your troubles. When you install Internet software, you can easily overwrite your old settings if you aren't careful. Choosing Continue in the AOL installation dialog in Figure 6-4 could mean trouble for your regular Internet connection.

Typically, any new Internet service provider will overwrite the settings of a previous one. If you start having connection troubles, ask yourself if you've accidentally changed the settings. In such a case you may need to decide which software you really want to use, remove the one you don't want, and re-install the desired application. Remember that as a later application overwrites or changes existing software, the
safest recovery frequently is to remove both programs and re-install the one you want to use.

"What could change?" is your next question. Think like your Mac. What does it do when it tries to complete the task you’ve set for it? For example, if your mouse suddenly quits working and restarting leaves it frozen, think like your mouse. What is it plugged into? This would lead you to a loose connection in your ADB chain. Maybe the connector going into the keyboard is loose or perhaps it is loose in the back of the machine.

This same line of thinking works especially well for networks. If you typically connect to a server on another floor of the building, for example, see if you can connect to anything on that floor. If you can’t get to something on the Internet, what can you get to? If you can get your mail, then you are probably connected to your provider. If you can get to other websites, then the problem isn’t likely to be with your machine or connection. Did you type the URL correctly? This question-and-answer process can help you narrow the problem to your machine, the service, then the network at large, or the site you are connecting to.

Finally, "Is there another way to do it?" While nailing down the ulti-
mate cause of a problem may be the long-term goal, when deadlines loom any solution is welcome. The saying “Any port in a storm,” comes to mind. If you have trouble opening a file in one program (ClarisWorks, for example), try another. Sometimes you can open a file in Graphic Converter and save it in a format that ClarisWorks can import. The same applies to your other software. And if you can't reach one printer on the network, can you reach another? Get creative.

Resources

After trying to think your way out of a problem, you might try to read your way out. Consult your manuals, reference books, and the Internet. There is probably a website or book devoted to your specific application or problem.

![Read Me Icon]

Figure 6-5: Application Read Me File Icon

It may seem blasphemous to the hacker spirit or the intuitive nature of the Mac, but try reading the instructions and "read me" files such as the one in Figure 6-5 that came with the software or hardware you are troubleshooting. For example, if you had installed QuickDraw GX and found yourself having font problems, then the instructions for converting Type 1 PostScript fonts would come in handy. You'll find them in the "read me" file that accompanies that installer. Though you can get a lot out of experimentation and intuition on the Mac, it shouldn't be relied on in isolation.

All manuals are not created equal, so your mileage may vary. Generally, the more expensive the application, the better the documentation, but not always. Some good examples include the documentation for Claris FileMaker Pro, a database design package, and Final Draft.
screen-writing software from BC Software Inc. Both sets of documentation come as actual softbound books, which lets you flip through at your leisure and read while you work. Other products have gone digital with their documentation, forcing you to pull them up through an internal document reader or online help. Depending on your work style and personal preferences, the electronic format may be preferable. In many cases the information supplied in electronic documentation is very good. Don't assume that just because a particular product doesn't come with a printed manual the documentation is second class. Contrariwise, a printed manual doesn't assure good or even usable documentation.

Figure 6-6: Sad Macs, Bombs, and Disasters
Other books might prove helpful as well. The hands-down champion for solving Mac problems is *Sad Macs, Bombs, and Other Disasters* by Ted Landau shown in Figure 6-6. This book deals strictly with the downside of your Mac. It is even recommended reading for Apple’s support technicians. Be warned though, you’ll hit the ground running. Know your way around your Mac. It also doesn’t cover application-specific problems. If you are having problems mastering ClarisWorks, then buy a book on ClarisWorks instead.

Another good book is *Macworld Mac Secrets* by David Pogue and Joseph Schorr. Although this isn’t directly a book about troubleshooting, there has never been a more eclectic collection of trivial details and hidden secrets about your Mac in one place. The book also includes a CD-ROM with shareware you can actually use. Unlike *Sad Macs, Bombs, and Other Disasters*, *Secrets* touches on solutions for basic problems and even application-specific problems. It also contains a lot of tips and background info about your Mac and its history.

Finally, there is a great deal of help online. Try following the instructions for searching the Internet in Chapter 17—Working the Internet. Search both Usenet and the World Wide Web. Someone else out there may have already experienced and solved your problem. Usenet is a collection of electronic discussions called newsgroups that include dozens of Macintosh topics. A typical topic looks like microsoft.public.windowsnt.mac, shown in Figure 6-7. You can learn more about newsgroups in Chapter 17. They are full of helpful advice on everything from software to hardware problems as discussed in comp.sys.mac.hardware, shown in Figure 6-8. In addition to these Internet discussions, you can find lots of useful information on Mac-oriented websites like the ones listed below.

*www.AmbrosiaSW.com/DEF/* – The Mac Pruning Pages: The first page reads, “The indispensable guide to what’s dispensable on your Mac,” and that’s exactly what it is. This site lists almost every extension and control panel on your Mac. You can also download the useful InformINIT as well.
CHAPTER 6: TROUBLESHOOTING

MACs freeze

2 + 2 Can't see Mac Server from NT Server
3 + NT Workstations and Macs
4 + NT Server in Mac Chooser
5 + "Add Printer" Out of Resources ????!!!!!!!
6 + 2 Corrupt file & Folder removal
7 + Mac Volume Size Limitation
8 + NT 4.0 on a Mac?
9 + Disappearing files
10 + 2 Need help with migration issues
11 + Macintosh, NT login, & SecurID
12 + 2 user NT network: 1 PC and 1 Mac
13 + NT4 On MAC
14 + Most stable setup: NT server with Mac client
15 + Mac Users
16 + time sync
17 + How to connect a NT-Laptop to a MAC
18 + Eudora and Exchange
19 + 2 MAC problems w/NT 4.0
20 + Macintosh resource fork on NT server, format
21 + 7 scsi drivers installed???

Figure 6-7: Usenet microsoft.public.windowsnt.mac Icon

comp.sys.mac.hardware

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<th>Subject</th>
<th>From</th>
<th>Sent</th>
<th>Size</th>
</tr>
</thead>
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<tr>
<td>Re: Benefit of a Level 2 cache?</td>
<td>J. Shields</td>
<td>10/1/97 2:07 PM</td>
<td>2KB</td>
</tr>
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<td>1KB</td>
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<tr>
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<td>Hüsner Peter</td>
<td>10/1/97 5:46 PM</td>
<td>1KB</td>
</tr>
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<td>10/1/97 6:22 PM</td>
<td>2KB</td>
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<td>2KB</td>
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<td>Pinghua Young</td>
<td>10/3/97 12:04...</td>
<td>1KB</td>
</tr>
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<td>Pinghua Young</td>
<td>10/3/97 12:07...</td>
<td>1KB</td>
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<td>APS 2x CD Recorder for sale for onl...</td>
<td>Pinghua Young</td>
<td>10/3/97 12:09...</td>
<td>1KB</td>
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<td>Mario Vukelic</td>
<td>10/3/97 10:06...</td>
<td>1KB</td>
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<td>Mike Carrenus</td>
<td>10/3/97 10:17...</td>
<td>1KB</td>
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<td>Tom Johnson</td>
<td>10/3/97 7:04 PM</td>
<td>2KB</td>
</tr>
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<td>Apple one scanner driver wanted</td>
<td>Grethus Bade</td>
<td>10/3/97 7:14 PM</td>
<td>1KB</td>
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<tr>
<td>Error no. 15 with a Quantum PB drive</td>
<td>Jon Naude</td>
<td>10/3/97 8:35 PM</td>
<td>1KB</td>
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<td>mlsan@remove</td>
<td>10/4/97 7:00 AM</td>
<td>2KB</td>
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</tbody>
</table>

From: mlsan@remove-goodnet.com To: comp.sys.mac.hardware
Subject: Hooking up my Mac to a stereo receiver?

Figure 6-8: Usenet comp.sys.mac.hardware Group
www.macfixit.com – *Sad Mac, Bombs, and Other Disasters* update page: This site contains up-to-the-minute conflict and update news as well as a searchable archive and links to other sites. For an all-encompassing site of Mac fixes, check here.

www.macintouch.com – MacInTouch: MacInTouch has been many things in its time. In 1985 it was an independent journal about the Macintosh. Later it became a column in *MacWeek* before becoming the website it is today. MacInTouch has earned a reputation for responsive and rapid reporting on Mac news and updates.

www.ogrady.com – O’Grady’s Power Pages: If it is Powerbook problems that plague you, then this is your site. You’ll find here the latest Mac news along with Powerbook tips, warnings, and update information.

www.versiontracker.com – Version Tracker: Version Tracker searches the web so you don’t have to, according to the front-page blurb. If you have a problem that might be fixed by a software update, check here first. The list is updated daily and can verify what the latest version number of something is and link you to downloads.

**Helpdesk or Support**

The final source for support is usually a help desk. When you decide to call technical support such as 1-800-SOS-APPL or the help desk at your Internet provider, it pays to be prepared. Remember that although the person you speak to on the other end is trained to help you track down the problem, he may be as confused as you are by the behavior your Mac has developed. If you’ve done all of your homework, then you might even know more about the problem than he does.

The most important thing you can do is be prepared. Have a complete list of notes including serial numbers and model numbers where appropriate. Also, don’t be surprised if you don’t get through instant-
ly. Wait times are an unfortunate staple in the support industry. If you can be physically sitting at your computer, then be there. It helps to try things immediately and evaluate their effectiveness while you are on the phone.

Give the support person as much detail as you can. Tell him about what you have already tried as well. He probably will run down a checklist or procedure for your problem, and you may find you have already tried some of the solutions.

Finally, stay calm. Taking out your frustration on the support person won't solve your problem and will just make his job harder.

**Troubleshooting tools**

When you are trying to figure out why something isn't working, nothing could be handier than a full toolbox. The applications and utilities below are easy to find and handy to have around.

**Quick Find** - Here are a few references you may need:

- **Apple System Profiler** - www.apple.com - 408-996-1010
- **Conflict Catcher** - www.casadyg.com - 408-484-9228
- **FWB ToolKits** - www.fwb.com - 415-325-4392
- **InformINIT** - www.AmbrosiaSW.com/DEF/ - Shareware
- **Norton Utilities** - www.symantec.com - 800-441-7234

**Apple System Profiler - FREE with Mac OS 8 or System 7.6**

The Apple System Profiler shown in Figure 6-9 comes with System 7.6 or Mac OS 8. It is discussed at length in Chapter 3 as an item in your Apple menu. You can generate reports such as the one in Figure 6-10 that let you know exactly what is installed on your Mac. Consider this
CHAPTER 6: TROUBLESHOOTING

Figure 6-9: Apple System Profiler

Figure 6-10: Installed Application Report Sample
report a must-have item when you call technical support. You have everything they are likely to ask about right in front of you when you call.

**Bootable CD or Disk - FREE with your system or Mac OS 8**

A Disk Tools disk like the one in Figure 6-11 is a requirement for any troubleshooting or Mac repair. This disk tools contains a System Folder and two essential Mac tools: Disk First Aid and Apple’s Drive Setup as shown in Figure 6-12. You can also startup from the Mac OS 8 CD-ROM and use the very same utilities. Starting up from a CD or disk lets your other utilities, such as Norton Utilities or Disk First Aid, have free reign on your hard drive. They can fix files such as the Finder or the System that are normally off-limits for repair while in use.

---

*Figure 6-11: Sample Disk Tools Disk*

*Figure 6-12: Folder With Disk First Aid and Apple’s Drive Setup*
Conflict Catcher - $70
Cassady & Greene's Conflict Catcher is discussed in Chapter 7--Managing Control Panels, Extensions, and Accessories. It will ferret out extension conflicts for you by walking through a series of restarts. Each time it restarts, it tries a new combination of extensions and you tell it whether the conflict still exists. You can also use the Extension Manager to manually track down extension conflicts as discussed in Chapter 7.

FWB ToolKits - $60 - $125 per ToolKit
FWB makes a suite of programs such as the CD-ROM ToolKit shown in Figure 6-13 that can be useful when you are trying to track down, patch, or repair a problem. Their Hard Drive ToolKit will install drivers and mount troublesome drives. It also can be used to reformat some drives for use with your Mac. If you are working with your internal Apple-installed hard drive, then you are better off using Apple Drive Setup to format or partition your hard drive. See Chapter 12-Drives & SCSI Voodoo for more on hard drives and your Mac.

Figure 6-13: CD-ROM ToolKit
InformINIT - Shareware $15
Byte-for-byte InformINIT is the best tool you can own for understanding your extensions and control panels. It lists and describes just about every extension or control panel you are likely to have. It is discussed at length in Chapter 7—Managing Control Panels, Extensions, and Accessories. If you are part of a larger organization, site and worldwide licenses are available. See www.AmbrosiaSW.com/DEF/.

Norton Utilities - Around $100
Norton Utilities is about the only game in town for hard-drive diagnostics and repair. They have simply purchased or beaten out all other competition. When you run Norton Utilities, you get a suite of options shown in Figure 6-14. You can fix minor disk problems, speed up your hard drive, and recover lost files with Norton Utilities.

---

Figure 6-14: Norton Utilities Options
Common Problems – General Tips

There is no single procedure for solving all of your problems, but you can follow a few general guidelines for some of the most common ones. This section looks at common hard-drive, printing, networking, Internet, and general software troubles. Use this section as a starting point when something goes wrong. Consult the appropriate chapter on the specific topic for more detailed information.

There are a few things to consider about any problem before you dig too far. First, is it supposed to work this way? You can turn many software functions on and off from Preferences or Options controls inside the software itself. The options in Figure 6-15 are from Netscape. The actual control panels and their location will vary from application to application. If someone had set Netscape to start up with a blank page instead of your favorite website, then you might think it was broken. It
is a little like thinking the stereo is broken and finding that the volume was turned down. Before you do too much other troubleshooting, make sure no one has changed the settings.

Another possibility with any problem is a corrupt or troublesome extension. Extension conflicts can cause a number of errors that can mimic other problems. You can restart your Mac with the extensions off by holding down the [shift] key. You can also use the Extensions Manager to disable any suspect extensions and then restart.

Next, is it just unplugged? Don't overlook the obvious. Check all connections and plugs. Don't forget extension cords and multistrips either.

Also, your Mac may try to tell you what is going wrong. It uses cryptic error codes that range from the negative 200s up to about 28. Some of the common error codes and their meanings are listed below.

- **Error -200 to -232**: Sound or sound file problem
- **Error -130 to -132 and -120 to -127**: HFS or disk problems
- **Error -91 to -99**: AppleTalk problems
- **Error -67 to -90**: More disk problems
- **Error -64 to -66**: Font problems
- **Error -60**: Disk directory problem
- **Error -44 to -46**: Locked disk
- **Error -39**: Corrupt or damaged file (try reinstalling)
- **Error -34**: Disk is full

The positive errors generally deal with software and memory. A few of the more common ones are

- **Error 01**: Bus or Type 1 error (could be RAM fragmentation)
- **Error 03**: Illegal Instruction (could be out-of-date software)
- **Error 09 & 10**: Trap errors (more illegal instructions as above)
Error 15: Segment loader error (PowerPC error loading to RAM)

Error 20 & 28: Stack ran into heap error (the program overstepped its bounds in RAM)

Error 25: Memory full error (try a larger RAM allotment to the application)

Error 26-27 & 30-31: Missing packages (it may be time to reinstall the System Folder)

Finally, there are three things you can try on almost any general Mac problem with some chance of success. They are restarting, rebuilding the desktop, and “zapping the PRAM.” Restarting can fix a lot of minor software-based problems from confused TCP/IP settings to application troubles. Trying this won’t hurt anything and could help a great deal. When you restart, you may want to rebuild the desktop as well. Do this by holding down the ⌘ + option keys when you restart. Rebuilding the desktop will solve some drag-and-drop problems as well as missing custom icons. Again, there is no downside in doing this.

Your Mac also has a small piece of memory called the parameter RAM. This is usually referred to as the “P” RAM. To reset it, you hold down the ⌘ + option + ⌘ keys at startup. Your Mac will chime again as if it is restarting and flush this memory. That procedure is known as zapping the PRAM. The downside of this is that you could lose settings in some of your control panels and applications. The advantages usually outweigh the risks, though. This small fragment of memory can become corrupted and create all sorts of havoc, from missing modems to fidgety networking. See Chapter 14 for more on both zapping the PRAM and rebuilding the desktop.

Hard Drive

Hard-drive problems are disastrous when they occur. It could be just a momentary glitch or it could be a sign that the end is nigh. You can never be sure which. Check the obvious stuff first. Is the drive plugged in? Is the power
on? Is it terminated? (See Chapter 12–Drives and SCSI Voodoo.) Finally, make sure you restart one more time after giving everything a hopeful tug and jiggle. If the drive still won’t come up, what you do next depends on one major question: Can you start up or not?

If the only hard drive on your Mac won’t boot, then you are dead in the water. All you have is a plaintively blinking question mark on your screen. This is the most common sign of total disaster discussed at length in Chapter 14–Disaster Recovery. If nothing in this chapter works, check out the other suggestions in Chapter 14.

First, try booting from your System CD or Disk Tools diskette if available. If that works, run Disk First Aid or Norton Utilities on your drive. If you can’t boot from the drive and neither of these programs can repair your disk, you may be out of luck. If so, head to Chapter 14.

If you can boot either from the flaky drive or another drive on your Mac, try running an application such as SCSI Probe. SCSI Probe is discussed in Chapter 12–Drives and SCSI Voodoo. It lets you mount an unmounted drive. It may tell you that there is another device, such as a scanner or Zip drive, at the address you are trying to access. If so, act accordingly and change SCSI ID on the drive in question. If SCSI Probe lets you mount the disk, then run Disk First Aid or Norton Utilities on it.

Since a Mac’s SCSI drives can become troublesome if other devices have the same ID, it can be worth your while to unplug everything but your problem drive. If the problem is sporadic and intermittent, try reordering your SCSI chain and see what happens. You might try a pass through terminator as well. For more on this and other hard-drive topics, see Chapter 12.

**Printing**

Printing can be frustrating if you are on the road or on a network. Of course, it can even fail when you have your Mac connected directly to a trusty StyleWriter. As with everything else, check the obvious first. The
number-one reason print jobs fail is that something someplace is turned off or unplugged. Check it all and try again, but try only once or twice before looking deeper.

Does your Mac give you an error message? As we've already seen, those messages can tell you exactly what's wrong. For example, they may say that you are out of paper or that AppleTalk is inactive. Take any advice you are offered. If you are using Desktop Printing, double-click the Printer icon on your desktop. The print queue will look something like Figure 6-16. Notice that it even tells you the problem in this case: You are out of paper.

Next, check the Chooser and make sure the proper printer is selected. You'll find the Chooser under the Apple Menu. Most likely, your Chooser will have more than one printer installed as shown in Figure 6-17. Make sure you have the correct printer selected. If you don't, then you should be getting error messages such as "Printer not found" or "Printer unavailable." If you have the wrong printer selected and you aren't getting errors, then you may be printing to another printer out on the network. Either way, switch back to the correct printer and try again.

![Figure 6-16: Print Queue Display](image)
If nothing seems to be working, try directly connecting to the printer if it is on a small network. You can even use a regular printer cable, the cable from your QuickTake camera, or any other Mac serial cable in place of your LocalTalk, Ethernet, or Phone Net connector. If you switch from Ethernet to LocalTalk, make sure to switch your network to the new direct printer connection in the Appletalk menu. If you still can see the printer from the Chooser, then it may be time to reinstall the printer drivers. From any Apple System Software installer, you can select just the printer drivers with the custom installation option as shown in Figure 6-18. For more information on printing, see Chapter 10.
Networking

AppleTalk networking is built into every Macintosh. It is solid and dependable. Once it is up and working, problems are more likely to be caused by something unplugged than something in the software itself. For more on networking, see Chapter 9.

As with most of the problems discussed above, start with the obvious. Are you on the network at all? Can you see any other Macs in the Chooser, such as the server “Lexcorp” in Figure 6-19? If you can see other servers and the Mac you are looking for isn’t present, then you’ll need to look to the other Mac for the problem. If you can’t get any network traffic, then it is time to check those cables.

What’s unplugged? Check the cables connecting your Mac to the network. These will be Ethernet or LocalTalk cables of some sort. If your network requires terminators at each end, such as PhoneNet, LocalTalk,
or 10Base-2 Ethernet, then one of those could be loose. Check them. It is easy for someone in the office to unplug one by accident. Check your transceiver connections as well. Some Macs come with large RJ-45 plugs in the back. These look like oversized phone plugs and let you directly connect to a 10Base-T Ethernet network. Other Macs require you to add a transceiver. Make sure it is plugged in snugly as well.

You can also be looking at the wrong network. You can switch your connection from LocalTalk through your printer port to Ethernet through your built-in Ethernet or card. This is controlled from the AppleTalk control panel shown in Figure 6-19. If you click on the Connect Via pop-up menu at the top, you'll see your network options, as in Figure 6-20. Make sure you are connected to the same network as the printer or computer you are trying to find.

![AppleTalk Control Panel](image1)

*Figure 6-19: AppleTalk Control Panel*

![AppleTalk Network Options](image2)

*Figure 6-20: AppleTalk Network Options*
It may be that AppleTalk is simply off on the machine you are trying to reach. Try checking that on the other machine's Chooser. If you can see the machine you want to connect to but your username and password won't work, then you may need someone to create an account for you with the Users & Groups control panel in Figure 6-21. As a last resort, try reinstalling just your networking software. Finally, see Chapter 9 for more information on networking. It explains networking setup and Open Transport in detail.

Figure 6-21: Users & Groups Control Panel

Internet

Internet settings and Open Transport are discussed in Chapter 17—Working the Internet. There are many, many things that can go wrong when you get online to browse a web page. Most of the time the problem will be something relatively dumb on your end, such as a typo in your logon script or overwritten settings. Occasionally the problem
will be completely out of your control. The phone company, your Internet provider, and even the website or service you are trying to reach can all fail in a dozen different ways.

Among the most common and insidious dangers to your Internet settings are other Internet Service Providers or ISPs. When you install that AOL software, you can overwrite your Internet settings by making wrong choices. You have already seen Figure 6-22 in our discussions above. Clicking “Continue” will install AOL’s settings over your old ones. Even if you don’t use it past your free time, you’ll need to reinstall your current ISP’s software. The same holds true for other ISPs’ installers as well. They may overwrite the software and settings you are currently using.

![Figure 6-22: AOL Install Dialog](image)

When you can’t connect to the Internet or get online, before you call technical support or get upset, restart your Mac, turn your modem off for a few seconds and then back on, and try again. The modem, your software, the Mac System software, or any number of other things can sometimes get confused. Simply restarting will solve the problem many times.

Next, figure out what you can reach. If you are trying to get to a website and failing, try another site instead. If you can reach several web-
sites and only one is problematic, then you can be pretty sure that the
problem is that one’s end. Of course, it could be a typo on your part.
Double-check the URL. Can you get to your ISP’s web page? If you can’t
reach that or any other page, then there is probably something wrong
with your entire connection. Try getting email or some other connection
to be sure.

Now we’ve established that you aren’t getting anywhere. Is your com­
puter even trying to dial? This is where an external modem is very
handy. Can you see any flashing lights or indications that it tries to con­
nect? Do you hear it dial? If you don’t get any indication of dialing at all
or if you get an error message such as “Timed out waiting on OK” or
“Modem not found,” then the problem probably lies somewhere on your
end with the modem itself. If it dials and appears to connect but you
can’t get anywhere, then the problem may be your TCP/IP settings.

You can also experience busy signals or “All circuits are busy” mes­
sages. Busy signals can be a sign that it is time for your ISP to expand
capacity, or they can be an indication that something is wrong with the
phone connection itself. Listen to the character of the busy signal. Does
it sound normal? Is it faster or slower than a regular busy signal? If you
have a fast busy signal, make sure you don’t need to dial a 9 or some
other access code to get out on the line you are using. If not, report the
problem to your ISP.

No modem connection at all is probably just a sign that something is
unplugged. Check your cables, and if it is an external modem, see if it is
plugged in and turned on. Next, check out the modem and TCP/IP con­
trol panels. The modem control panel is shown in Figure 6-23. You can
tell your Mac to look for a modem on any serial port and internally with
the Connect Via pop-up menu at the top of the window. Make sure the
port you are selecting actually has a modem attached. On the TCP/IP con­
trol panel shown in Figure 6-24, you can set the Connect via pop-up
menu to look for the Internet over your Ethernet or AppleTalk networks
as well as PPP. Make sure this setting is correct also. If you expect to
connect via modem, then you need to make sure this is set to PPP.
CHAPTER 6: TROUBLESHOOTING

Figure 6-23: Modem Control Panel

Figure 6-24: TCP/IP Control Panel
Finally, when it looks like you are connecting but you can't get anywhere, double-check your TCP/IP settings. The most important of these is the name server address. Your ISP's name server is like a traffic cop on the Internet telling your applications where they need to go. An example of these numbers is shown in Figure 6-25. If you aren't sure what your settings are, then you'll want to check with your ISP for more information.

![Sample TCP/IP Address](image)

**Figure 6-25: Sample TCP/IP Address**

**General Software**

The first thing to ask when troubleshooting general software problems is, "Can I launch?" If the answer is no, then the next question is, "Could I before?" If you have just upgraded your Mac or copied an application over from another machine, then it may not launch because it doesn't have everything it needs. You may have, for example, a PowerPC application on a 68040-based Mac. You may have forgotten all of the application's preference or helper files. If either is true, then it simply won't work.

If the software was working fine and suddenly developed troubles launching, try checking the entire hard disk with Disk First Aid or Norton Utilities. There is a strong possibility that you may need to reinstall if these programs find trouble. Fidgety or uncooperative applications can be a sign of disk corruption. Most of the time, they won't work at all. Repair the drive with these utilities and then reinstall.
Problems saving files can be caused by disk errors as well. Again, check out your drive with the appropriate tools. See Chapter 13—Preventive Maintenance for more on Disk First Aid and Norton Utilities along with plenty of other advice for keeping your Mac in tip-top shape.

If you can launch your software but still have problems, consider the possibility of an upgrade. It may be that an upgrade is available that will solve the problem you are dealing with. See the manufacturer's website or contact the company by phone. Another possibility is that the application's settings have been changed so that it seems to be acting up. For example, if you accidentally set Photoshop's scratch disk to a drive with very little storage remaining, then the sudden "Scratch Disk is Full" errors would get downright annoying. If you didn't know that a coworker had made the switch while you were at lunch, you could begin to believe that something was wrong with Photoshop itself. Be sure to take a close look at an application's menus and settings to see if you can track the trouble down that way.

Finally, see the chapters toward the end of this book for tips on specific software packages. If you have trouble opening a file, then you may need to consider saving it in another format. For example, save a word-processing document as text instead of Microsoft Word 5.0 format, and you will be able to open it in almost anything. Several interchange formats are discussed under their appropriate places in Chapters 16-22.
managing control panels, extensions, & accessories

CONTROLLING CONTROL PANELS, EXTENSIONS, AND SOME OF the System folder’s other files ranks right up there with herding cats in the chaos-and-frustration department. It simply isn’t as easy as it should be. For one thing, it seems as if every program you install wants to tuck its own custom widgets into your System Folder. Your web browser scribbles small notes to itself in your System Folder as well. These cache files can balloon in size to several megs. Other files, such as SimpleText, breed like rabbits on your hard drive. It is a good idea to take control of them all if you can. We’ll look at the contents of your Extensions and Control Panels folders in detail and show you some tricks for controlling these and other files.

Extensions and Control Panels

Extensions modify the way your Mac works, but they can also be a source of headaches. The most disorderly and unruly folder in your Mac is often the Extensions folder or its cousin, the Control Panels folder. Just what
do all of those extensions and control panels do? Turning on balloon help as in Figure 7-1 doesn’t tell you much. Control panels tend to be equally cryptic. Unless you are familiar with the specific application or service the extension supports, you may have no idea what it modifies or updates.

There are several ways to take control of these files. You can do it by hand or use one of several extension managers or utilities. Along the way you’ll learn what most of these files are and something about what they do. In addition to harboring extensions and control panels, your Mac can get cluttered up with several other stray files and accessories. An unused Netscape folder can waste several megabytes of storage, and it isn’t unusual to have several copies of common utilities such as SimpleText wasting space.

System extension

This file adds functionality to your computer. To add this file’s functionality to your computer, place the file in the Extensions folder and then restart the computer.

AppleScript™

Figure 7-1: Balloon Help

Basics and Tools

If your Mac acts strangely after startup, or an extension doesn’t load, then you may be dealing with an extension conflict. This occurs when one extension keeps another extension from working properly. It can happen because one extension overwrites another in RAM or because
one extension tries to change the same settings as another extension. For example, the extension that lets you use your CD-ROM drive may conflict with the extension that supports your Zip drive.

To track down one of these conflicts, you need to resort to a process of elimination. This involves restarting your Mac without certain extensions present and seeing if the problem goes away. You can do this manually. Use your Mac's Extension Manager in System 7.5 or later, or use a commercial product such as Conflict Catcher.

No matter how you choose to track down conflicts, you will probably want to try starting up with all extensions off. Do this by holding down the `~` key during startup. With all of the extensions off, you can make sure the problem is indeed related to the extensions and not something else on your Mac. The major drawback in this is that much of your Mac's functionality is lost when you start up without extensions. Everything from QuickTime to your CD-ROM may quit working without the proper extensions.

You can manually disable extensions and control panels by removing them from the System Folder. Just pulling them from their Extensions or Control Panels folders into the System Folder won't work since your Mac loads the extensions and control panels it finds there as well. The easiest way to do this is to create folders called Disabled Extensions and Disabled Control Panels inside your System Folder. You can then drag extensions and control panels to these folders to disable them and restart. In fact, this method is so effective that it is used by all of the extension management utilities we'll discuss next.

Your Mac comes with the Extensions Manager as part of the System software if you are running System 7.5 or later. You'll find the Extensions Manager control panel in the Control Panels folder under the Apple menu. You can also bring the Extensions Manager up by holding down the space bar during startup. Either way, if you are running Mac OS 8 or System 7.6, the Extensions Manager will look like the one
in Figure 7-2. The earlier Extension Manager of System 7.5 looks slightly different but is essentially the same.

![Extensions Manager](image)

*Figure 7-2: OS 8 Extensions Manager*

When you bring up the Extension Manager in System 7.6 and Mac OS 8 with the space bar at startup, you can change immediately which extensions load. Just click on the check boxes to select or deselect the extensions as shown in Figure 7-3. When you bring up the Extensions Manager after startup, it works exactly the same way with one exception, shown in Figure 7-4. The changes you make do not take effect until you restart.
Selecting an item and then clicking the small Show Item Information triangle in the lower left-hand corner of the Extensions Manager reveals the extra information shown in Figure 7-5. Not all of the extensions or control panels have such helpful descriptions, though. Be prepared to see a few blank and unhelpful entries here.

You can change how you view the extensions as well. When you launch the Extensions Manager at startup, you'll find the View controls under the Selected Set pop-up menu. If you launch the Extensions manager after startup, these settings are found under the View menu as shown in Figure 7-6.
CHAPTER 7: MANAGING CONTROL PANELS, EXTENSIONS & ACCESSORIES

Figure 7-5: Show Item Information Display in Extensions Manager

Figure 7-6: View Menu After Launching Extensions Manager
Viewing the extensions by folders places them into a hierarchical view similar to the List view in the finder. You can then select or deselect individual items or entire folders as shown in Figure 7-7. Though this makes it easier to separate the control panels from the extensions, it isn't the easiest way to work. Selecting the As Packages option as shown in Figure 7-8 lets you view extensions and control panels in logical groups. Notice how the Iomega extensions and control panel are grouped into one package called Iomega Software 5.0.1 in this example. This makes it very easy to turn off just the packages you don't want.

The Extensions Manager also helps you by creating sets of extensions that let you quickly change out what you load or don't load. For example, you might want to create a set of extensions optimized for working in your 3D applications without the overhead of networking. You'll find several sets already under the Selected Set pop-up menu. These include
CHAPTER 7: MANAGING CONTROL PANELS, EXTENSIONS & ACCESSORIES

Figure 7-8: As Packages Extensions Display

My Settings, Mac OS 8.0 all, and Mac OS 8.0 base. Clicking on the Duplicate Set button at the lower-right corner of the Extensions Manager lets you create a new set as shown in Figure 7-9. You can then select just the items you want included in this set, restart, and you will be running under your setup.

The main thing the Extensions Manager doesn't let you do is change the order in which extensions load. That is the big advantage to the
commercial extension managers. Sometimes just changing when an extension loads can clear up a problem. To change this order manually you have to trick your Mac. Since it loads the extensions and control panels alphabetically as discussed in Chapter 4, you can change the loading order by adding a space in front of the extension name. You can add the letter z to move it to the end of the startup order. See Chapter 4–Startup & The System Folder for more on the startup process.

Conflict Catcher or Now Startup Manager are two commercial products that go beyond Apple's Extensions Manager. They let you change the startup order of items and hunt down conflicts. Both look similar to the Extensions Manager you've already seen. Take a look at the Conflict Catcher 4 control panel in Figure 7-10. It works just like the Extension Manager in the sense that it gives you control of folders and groups. In addition, Conflict Catcher can automate the process of tracking down

![Figure 7-10: Conflict Catcher 4 Control Panel](image-url)
conflicts. When you click on the Conflict Test button in the lower-left of the control panel, you get the Conflict Test Checklist shown in Figure 7-11. This checklist walks you through setting up a test. After that, you let Conflict Catcher try different combinations of extensions while you grade the outcome. This means you restart several times, but Conflict Catcher handles the chore of disabling extensions and keeps track of which combinations you have tried.

How do you decide where to start looking for a conflict? Whether you use a commercial product or manually disable your extensions, you start in the same place: your intuition. Conflict Catcher even asks you to make your best guess, as shown in Figure 7-12. Generally, extensions that do similar chores on your Mac will be more likely to conflict with each other. For example, two extensions that change the look of your desktop would be likely candidates for conflicts.
CHAPTER 7: MANAGING CONTROL PANELS, EXTENSIONS & ACCESSORIES

Using intuition, you can select the startup files that you think might be causing your problem. Conflict Catcher will test these files first to see if your intuition is accurate.

Quick Find - Here are a few references you may need:

Conflict Catcher: www.casadyg.com -800-359-4920
InformINIT: www.AmbrosiaSW.com/DEF/-Shareware
Now Startup Manager: www.nowutilities.com -800-730-7854
Clean Sweep: www.aladdinsys.com -408-761-6200

Extension Bestiary

There is no comprehensive tome listing all of the extensions that exist for the Mac. There simply have been too many different extensions with too many variations to list. That doesn't mean you can't identify the most common extensions and control panels in a few pages. The extensions and control panels here are listed in families based on their function. Some extensions, such as the Stuffit Engine, are loners, but others,
such as printing or QuickTime, involve several different extensions, files, and control panels. For more on what does what inside your Mac, see the Mac Pruning Pages at www.AmbrosiaSW.com/DEF/.

Here are a few of the most common families.

**Apple Guide:**
Discussed in Chapter 1, Apple Guide is part of the Mac OS comprehensive help. Apple Guide will actually show you how to do something on your Mac if you ask it.

<table>
<thead>
<tr>
<th>Product</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Guide</td>
<td>Extension</td>
<td>Activates the Apple Guide system in all Apple Guide-savvy applications</td>
</tr>
<tr>
<td>Apple Guide Enabler</td>
<td>Extension</td>
<td>Needed to activate Apple Guide on pre-System 7.5 systems</td>
</tr>
<tr>
<td>Mixins</td>
<td>Apple Guide Additions</td>
<td>Used by Apple and other software makers to extend Apple Guide. Do a search for the word guide on your Mac and you'll see many of the installed mixins with names such as Apple CD Audio Player Guide or Network Guide Additions. These will vary depending on the hardware or software you have installed.</td>
</tr>
</tbody>
</table>
AppleScript:
You may remember meeting AppleScript in Chapter 5. Through Apple events, AppleScript lets you control and pass information among applications on your Mac.

<table>
<thead>
<tr>
<th>Product</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Event Manager</td>
<td>Extension</td>
<td>Lets applications send messages to each other. In System 7.5 and above, this extension is incorporated in the AppleScript extension.</td>
</tr>
<tr>
<td>AppleScript</td>
<td>Extension</td>
<td>Gives your Mac the ability to understand AppleScripts.</td>
</tr>
<tr>
<td>AppleScriptLib</td>
<td>Shared Library</td>
<td>Used to communicate with other AppleScript-enabled applications.</td>
</tr>
<tr>
<td>FaceSpan</td>
<td>Extension</td>
<td>Comes with the AppleScript Development Environment and lets you add graphical user interfaces to your scripts.</td>
</tr>
<tr>
<td>Finder Scripting Ext.</td>
<td>Extension</td>
<td>Lets you script actions in the finder.</td>
</tr>
<tr>
<td>Frontmost Extension</td>
<td>Extension</td>
<td>Part of the commercial implementation of AppleScript and assists with complex user interfaces.</td>
</tr>
<tr>
<td>InLine Filter</td>
<td>Extension</td>
<td>Used to facilitate communication between PlainTalk and AppleScript.</td>
</tr>
</tbody>
</table>
Scripting Additions  Folder  Located in the Extensions folder. Contains extra AppleScript commands that are called when AppleScript needs them.

Script Editor  Application  Used to write and edit AppleScripts.

Chooser Extensions:
Theses extensions differ from regular extensions in that they are loaded by the Chooser.

<table>
<thead>
<tr>
<th>Product</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Printer</td>
<td>Chooser Extension</td>
<td>Just about any icon that looks like a printer in your Extensions folder is a Chooser extension for that particular printer. These extensions have descriptive names such as LaserWriter 300GX, or ImageWriter. They appear in the Chooser and let your Mac talk to that specific printer.</td>
</tr>
<tr>
<td>Apple ColorOne</td>
<td>Chooser Extension</td>
<td>Lets you select the Apple ColorOne scanner in the chooser.</td>
</tr>
<tr>
<td>Fax Sender</td>
<td>Chooser Extension</td>
<td>Lets you send faxes and places the fax option in the Chooser.</td>
</tr>
<tr>
<td>PDF Writer</td>
<td>Chooser Extension</td>
<td>Lets you print PDF files from Adobe Acrobat.</td>
</tr>
</tbody>
</table>
Communications Toolbox:
The *Communications Toolbox* is not actually one application or place in your Mac. It is made up of several files in your Extensions folder that collectively are referred to as the Communications Toolbox. These files take up very little hard drive space and no memory. They are loaded into an application's RAM allotment as needed to handle a variety of communications chores.

<table>
<thead>
<tr>
<th>Product</th>
<th>Tool Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple ADSP</td>
<td>Communications</td>
<td>Allows Apple Data Streaming Protocol connections on pre-System 7 systems. It is needed by the Newton and some games. An internal part of System 7.1, the communications tool is sometimes still needed by older software.</td>
</tr>
<tr>
<td>Apple Modem</td>
<td>Communications</td>
<td>Supports modem connections up to 230.4 bps on supported hardware.</td>
</tr>
<tr>
<td>AppleTalk DECEnet</td>
<td>Communications</td>
<td>Allows communications to VAX/VMS systems.</td>
</tr>
<tr>
<td>Claris Kermit</td>
<td>Communications</td>
<td>Used for kermit transfers under ClarisWorks terminal.</td>
</tr>
<tr>
<td>Express Modem</td>
<td>Communications</td>
<td>Communicates with the Apple Express Modem.</td>
</tr>
<tr>
<td>Serial</td>
<td>Communications</td>
<td>The mother of all communications tools provides the lowest level of serial connectivity.</td>
</tr>
<tr>
<td>TCPack for AOL or CompuServe</td>
<td>Communications</td>
<td>Allows TCP/IP connections by the AOL or CompuServe interfaces. Normally these applications call their servers directly.</td>
</tr>
</tbody>
</table>
OpenDoc:
OpenDoc is the component software architecture from IBM and Apple. It lets you combine separate parts of applications into a new whole. It also has a large number of cryptic additions to tuck away in your Extensions folder. See Chapter 5 for more on OpenDoc.

<table>
<thead>
<tr>
<th>Product</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFM-68K Runtime Enabler</td>
<td>Extension</td>
<td>Used by OpenDoc as well as Laserwriter 8.4.x, Desktop Printer 2.0.x, Cyberdog, Apple Media Tool, and AOL 3.0.</td>
</tr>
<tr>
<td>Editor Setup</td>
<td>Extension</td>
<td>Allows configuration of various OpenDoc editors.</td>
</tr>
<tr>
<td>NuDragLib.slb</td>
<td>Library</td>
<td>Loaded by a variety of OpenDoc components as NuThreadsLib.slb as needed.</td>
</tr>
<tr>
<td>NuTranslationLib.slb</td>
<td>Folder</td>
<td>Kept in the Extensions folder, it contains several OpenDoc documents and applications.</td>
</tr>
<tr>
<td>OpenDoc Libraries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOMobjects</td>
<td>Extension</td>
<td>IBM's Standard Object Model allows objects written in different languages to communicate with one another and share data.</td>
</tr>
</tbody>
</table>
Open Transport and PPP:

Open Transport is Apple's newest networking and communications standard. All networking from TCP/IP to AppleTalk is controlled by Open Transport in System 7.6 or later. In System 7.5.5 and earlier, you can switch between classic networking and Open Transport with the Network Software Selector.

<table>
<thead>
<tr>
<th>Product</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OpenTptxxxLib</td>
<td>Extension</td>
<td>These files have names such as OpenTptAppleTalkLib or OpenTptInternetLib. They provide Open Transport services to native PowerPC applications.</td>
</tr>
<tr>
<td>Open Tpt xxx</td>
<td>Library</td>
<td>These files have names such as Open Tpt ATalk 68K Library or Open Tpt Inet 68K Library. They are needed to process Open Transport instructions on older 68030- and 68040-based Macs. They are not needed on Power PC machines and can be removed.</td>
</tr>
<tr>
<td>Serial (Built-In)</td>
<td>Extension</td>
<td>Allows Open Transport-savvy applications to access built-in serial ports.</td>
</tr>
<tr>
<td>Open TPT Serial</td>
<td>Extension</td>
<td>This software allows PPP connections even when the serial port is being watched by your fax software for incoming faxes. Sometimes causes conflicts. Try having it load later in the startup process.</td>
</tr>
</tbody>
</table>
**Modem Control Panel**

Allows modem to be configured for Open Transport PPP. Settings include serial port used, speed, tone-, and pulsedialing.

**PPP Control Panel**

Controls the settings for PPP including scripted logins.

**TCP/IP Control Panel**

Controls settings for your Internet connection. You can select to connect over the local network or through PPP.

**QuickDraw 3D:**

QuickDraw 3D provides support for three-dimensional graphics and movies. It greatly accelerates the 3D abilities of programs that can take advantage of it.

<table>
<thead>
<tr>
<th>Product</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple QD3D Driver</td>
<td>Extension</td>
<td>This older driver isn't needed with the QuickDraw 3D extension 1.5 or later.</td>
</tr>
<tr>
<td>QuickDraw 3D</td>
<td>Extension</td>
<td>This is the module that lets applications take advantage of QuickDraw 3D. It supports the cutting, pasting, and rendering of 3D models, allowing many programs to run faster.</td>
</tr>
<tr>
<td>QuickDraw 3D</td>
<td>Extension</td>
<td>Added to support a QuickDraw 3D accelerator card, this document patches certain pieces of PowerPC code.</td>
</tr>
</tbody>
</table>
CHAPTER 7: MANAGING CONTROL PANELS, EXTENSIONS & ACCESSORIES

QuickDraw 3D IR Extension
Supports rendering with QuickDraw 3D through the Interactive Renderer.

QuickDraw 3D RAVE Extension
Lets software use QuickDraw accelerator cards with non-QuickDraw 3D applications.

QuickDraw 3D Viewer Extension
Used by SimpleText to display a QuickDraw 3D document. Called on by other software as a QuickDraw 3D viewer.

QuickTake:
As much fun as digital cameras are, the Apple QuickTake 150 and 200 are extension-heavy tools. They put several items in your system folder for later use.

<table>
<thead>
<tr>
<th>Product</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple QuickTake</td>
<td>Extensions</td>
<td></td>
</tr>
</tbody>
</table>

QuickTake Access
Allows the QuickTake camera to be controlled by 150 and 200 applications through QuickTime IC.

QuickTake Camera Extension
Allows camera access from the desktop.

QuickTake Image Extension
Allows serial connection of your QuickTake camera to the Mac.

QuickTake Image Control Panel Access
Decompresses QuickTake's proprietary image format. Controls access and functions of the QuickTake Camera.
**QuickTime:**
QuickTime is Apple's movie standard and it used to be a lot simpler. Today it is much more powerful and much more complex. It can understand MPEG and Midi, handle conferencing, do virtual reality, and talk to a QuickTake camera.

<table>
<thead>
<tr>
<th>Product</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QuickTime</td>
<td>Extension</td>
<td>This is the extension at the heart of QuickTime. It lets applications use QuickTime data types and play back QuickTime movies. Since many applications try to install QuickTime for you if they need it, keep a watchful eye out to make sure they don't overwrite the latest QuickTime extension with an older one.</td>
</tr>
<tr>
<td>MPEG</td>
<td>Extension</td>
<td>Allows QuickTime to unpack and play MPEG Extension video.</td>
</tr>
<tr>
<td>QuickTime</td>
<td>Control Panel</td>
<td>Lets you switch between various MIDI devices for MIDI playback.</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QuickTime</td>
<td>Extension</td>
<td>Provides the instruments to play back MIDI under Instruments QuickTime.</td>
</tr>
<tr>
<td>Musical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QuickTime</td>
<td>Extension</td>
<td>Improves playback of QuickTime on PowerPC machines.</td>
</tr>
<tr>
<td>PowerPlug</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QuickTime</td>
<td>Extension</td>
<td>An earlier version of the QuickTime PowerPlug.</td>
</tr>
<tr>
<td>PowerPC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
QuickTime VR Extension

Let's QuickTime play back virtual reality-environment files created in the QuickTime VR format.

QuickTimeVRLib Extension

This shared library contains more code for QuickTime VR.

Speech:

Apple's Speech software lets your Mac speak messages, errors, and text. It is controlled by several pieces of software that may vary depending on the language installed and the presence of Apple's PlainTalk voice-recognition system.

<table>
<thead>
<tr>
<th>Product</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MacinTalk</td>
<td>Extension</td>
<td>You will have some flavor of MacinTalk extension for speech if it is installed. Look for MacinTalk 2, 3, or Pro versions. This extension converts text to speech, and each level provides a higher-quality voice than the previous version.</td>
</tr>
<tr>
<td>Speech</td>
<td>Control Panel</td>
<td>The Mac's voice comes from here.</td>
</tr>
<tr>
<td>Speech Manager</td>
<td>Extension</td>
<td>Allows the Mac to speak text.</td>
</tr>
<tr>
<td>System Speech</td>
<td>Extension</td>
<td>Provides support for the voices as well as dialects.</td>
</tr>
<tr>
<td>Rules</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voices</td>
<td>Folder</td>
<td>Contains many Mac voices from Albert to Bad News.</td>
</tr>
</tbody>
</table>
Accessories

In addition to the extensions and control panels already discussed, your System Folder can attract other troublesome residents. These can range from toys and applications to massive amounts of cache and support files for other applications. It is important to keep these files trouble-free as well.

Toys and Utilities

Several programs install themselves into your Apple Menu, making it easier to find them. Several other programs start off as utilities and just become an annoyance quickly. These tend to be smaller shareware applications for the most part, but even your big software-makers can contribute to the problem.

Take lowly SimpleText, for instance. Have you ever done a Find to see just how many copies of that program are wasting your disk space? Don't be surprised if your hard drive reveals something similar to Figure 7-13 if you do a Find for SimpleText. This basic text viewer is installed by all sorts of programs from Mac OS 8 to Photoshop. The theory is that even if you didn't have anything else, you could use a free copy of

<table>
<thead>
<tr>
<th>SimpleText</th>
<th>55K application program</th>
<th>7/24/94</th>
</tr>
</thead>
<tbody>
<tr>
<td>SimpleText</td>
<td>74K application program</td>
<td>6/2/95</td>
</tr>
<tr>
<td>SimpleText</td>
<td>55K application program</td>
<td>1/31/95</td>
</tr>
<tr>
<td>SimpleText</td>
<td>18K alias</td>
<td>9/21/97</td>
</tr>
<tr>
<td>SimpleText</td>
<td>74K application program</td>
<td>4/21/97</td>
</tr>
<tr>
<td>SimpleText</td>
<td>74K application program</td>
<td>11/22/96</td>
</tr>
<tr>
<td>SimpleText</td>
<td>74K application program</td>
<td>8/29/95</td>
</tr>
<tr>
<td>SimpleText</td>
<td>18K alias</td>
<td>8/16/97</td>
</tr>
<tr>
<td>SimpleText Guide</td>
<td>370K document</td>
<td>11/20/96</td>
</tr>
</tbody>
</table>

*Figure 7-13: Duplicate Programs Display After Find*
SimpleText to read the Read Me files included with most software. The only way to take care of this trash is to manually toss the extra copies into the Trash.

Other applications leave controls and aliases in your Apple Menu for your convenience. The CD-ROM ToolKit from FWB leaves a CDT Remote in your Apple Menu for you to play CDs. Some Macro programs leave their controls there as well. If you throw the application out, you may forget these files, leading to more clutter. Again, manually pulling them out is about the best you can do. Aladdin's Clean Sweep software may help some. It contains tools to find orphaned and abandoned software on your Mac.

**Cache File and Folders**

Two very messy programs for generating unidentifiable files are the web browsers Netscape and Internet Explorer. Both keep folders in your system Folder just like Claris does for its software packages. In the Claris folder, you will find a common dictionary, translators, and help files. In the browser folders, you find settings files, bookmarks, and the mysterious cache files.

These cache files are tiny bits of the pages you've been to. This lets the browser reload recent pages faster. They have cryptic names such as cache357029.gif. If you let them, they can get quite large. Consult the instructions for your specific browser, but there is a setting to limit the size of this scratch space in your browser settings. If you have quit using one browser or the other, then toss the entire folder and save some disk space.

This clutter problem is the same for any software that puts loose items in your System Folder. You simply don't know what they are sometimes. Try to keep an eye out when you install new software so that these stray files don't overrun you.
YOU WOULD THINK THAT WITH DESKTOP PUBLISHING BEING WHAT it is on the Macintosh platform, a chapter on *fonts* would be relatively short. You just drag new fonts to the System Folder and they work. Who needs to know more? If you use only a few fonts for such everyday chores as writing letters and memos, then you'll probably never need 90 percent of this chapter. If you are a desktop publishing or graphics professional, use an older Mac or QuickDraw GX, or have a mix of strange fonts you'd like identified, then read on.

Fonts are kept in the Fonts folder inside your System Folder as shown in Figure 8-1. On screen and paper they are measured in *points*, each point being $\frac{1}{72}$ of an inch. They come in hundreds of different *font families* that are generally just referred to as fonts. The standard fonts installed on Mac OS 8 are *Charcoal*, *Chicago*, *Courier*, *Geneva*, *Helvetica*, *Monaco*, *New York*, *Symbol*, and *Palatino*. These are sometimes called the *System fonts*.

In addition to the System fonts, hundreds more can be obtained from vendors such as Adobe, Emigre, or Bitstream. And there are thousands upon thousands of shareware fonts out there. Sometimes software packages will add their own specialized fonts to your System Folder when they install.

Fonts have evolved a great deal over the life of the Macintosh, so you can bump into several font formats. In order of appearance, these are *bitmap* fonts, *Type 1* fonts, *TrueType* fonts, *Multiple Master* fonts, *TrueType GX* fonts, and *OpenType* fonts. Why so many font types? Well, a little history lesson is in order.
A font is a \textit{typeface} or \textit{style of lettering}. Until the Mac and other electronic text management tools came along, the term \textit{font} referred to a single size and style of type, since that is how fonts were handled and used. A printed page used, for example, a single Times 10-point font. It had been that way since the 15th century. Using a computer, though, you can change the size or style of type on a whim. In this new world the term \textit{font} came to refer to an entire family of typefaces. You can use Times in any size or variation.
In most Macintosh applications dealing with text, you'll have the option as shown in Figure 8-2 of changing the font, size, and style of text you use. You can even combine styles for effect such as “bold-italic” or “shadow-double underlined,” although the latter isn’t recommended. This ability to change and adjust type styles on the fly goes back to the Mac’s WYSIWYG foundations (see Chapter 5).

At first Mac used bitmapped fonts exclusively. Sometimes you'll see them called fixed-size fonts since they behave well only at one point size. These fonts shipped with the Mac 128 in 1984 and gave us the Mac’s look and feel from Chicago to that jaggy “outline-shadowed” style of early Mac printouts. You had one file for each font. The type you saw on your 72-dpi (dots per inch) screen was the same as the type that came out of your 72-dpi ImageWriter in those days. The bitmapped font file was made up of a tiny 72-dpi picture of each character in the font. Basically they were files full of little dots. Ironically, at 72 dpi a 12-point font is 12 pixels high. If you had a certain size bitmapped font, then the corresponding point size appeared, and still appears, as outlined text in your application’s size option as shown in Figure 8-3, indicating that this
font can be viewed exactly as it will appear on paper. It was all very convenient.

At least it was convenient until you wanted to print at a point size for which there was no bitmapped font. The Mac would do its best to guess the right size. The stretched-out or squashed result was seldom pretty.

The first LaserWriter changed that. It printed at an amazing 300 dpi and was based on Adobe’s PostScript technology. PostScript is Adobe’s page description language for printers, and it revolutionized and standardized much of the printing world. It certainly created Macintosh’s dominance of the desktop publishing market, and PostScript fonts remain a major standard today. With PostScript, you don’t send jagged pixel-paintings to your printer. Instead you send mathematical descriptions—outlines—of the font to the printer, which converts them to the dots you see on paper. This process is called rasterizing. The result is that these fonts are printed out smoothly at any resolution. These new fonts, called PostScript *Type 1* fonts, certainly offered improved functionality, but the new features came at a price.

---

*Figure 8-4: Screen Font and Printer Font File Icons*
First, you could no longer use one font file for both screen and printer. Though the printed page had leapt to 300 dpi, the screen still lagged at 72 dpi. Take a look at the two icons in Figure 8-4. You had to have two files on your Mac for each font now, a screen font and a printer font. To compound the problem, different vendors used different icons for their fonts, making them hard to identify on sight. If you didn't install at least one screen font, then you couldn't use the font at all. For more about icons, see Chapter 3–Finder and Menus.

Luckily Adobe blessed the world with Adobe Type Manager, or ATM, in 1989. Adobe Type Manager works like a virtual PostScript printer for your screen, translating the printer font's outline information into a bitmapped screen image. It also performs the miracle of allowing a non-PostScript printer such as the StyleWriter to print as if it were a PostScript printer.

This makes ATM essential for dealing with fonts. You still need at least one screen version of the font available so the Mac knows you have the font installed, though. Otherwise the font wouldn't appear in any of your application's font menus. This single screen font acts as a Type 1 flag for the system. ATM should take over from there, making your fonts look good at any size.

You may have some Type 3 fonts lurking about. When Adobe first introduced PostScript fonts, there were three kinds: Type 1, Type 2, and Type 3. The Type 2 fonts were never available to the public, and the format for Type 1 fonts was proprietary until 1991. Until then, Type 3 fonts were the only ones third parties could develop. They lacked the ability to do hinting, and ATM does not recognize them. Hinting helps clean up a font's image, and without ATM you need a half-dozen screen fonts for each. You will still run into them occasionally, and when you do, just keep on going.
The second cost hidden in this wonderful technology was in actual dollars. Apple was paying more than $700 per printer to include Adobe's technology. To lower costs and boost sales, Apple teamed up with Microsoft to develop an alternative. The result was TrueType.

TrueType fonts work just like Type 1 fonts with ATM, but you need only one file. The Mac takes the outline information of a TrueType font and creates a screen font, doing away completely with the need for a separate file in your System Folder. Figure 8-5 shows an example of a TrueType font you probably already have installed. Since TrueType technology is built into the System software, you don't need to include a screen font at all. The System can recognize the TrueType fonts just as they are.

![Figure 8-5: TrueType Font](image)

Notice that Figure 8-6 shows not only the TrueType font but several flavors of screen font as well! They are still included with your System software. Why? Well, an installed screen font speeds up your system. With ATM and TrueType, the Mac must examine the font and create its own bitmapped image for the screen. With a screen font installed, the Mac automatically uses that.
Theoretically TrueType fonts are cross-platform, but stripping out the proper resource from the Mac file or properly converting the Windows file can be a bear. Look for ATM Deluxe to help with this task. If you can find it, Font Hopper will also do the trick. Formerly the tool of choice for this job, Font Hopper's publisher Ares Software was purchased by Adobe and no longer sells the product. Of course, Adobe sells ATM Deluxe...
Adobe came out with *Multiple Master* fonts as well. These are simply PostScript Type 1 fonts, and like a good set of Legos, their use is limited only by your imagination. They come in sets of the most extreme versions of a single variation like "bold" and "light." Using a special utility, you can mix up just the font you want. This went a long way toward satisfying the truly font-hungry graphic designers out there, but there was a demand for still more.

*TrueType GX* was Apple's next advance to the font world, but most Mac users have never experienced it since it is an optional install. Part of QuickDraw GX, TrueType GX adds new capabilities to your Macintosh that are actually older than computing itself. One of the classic tools of typography had been lost to the black art of computing. This tool is *ligature*, and no, you probably aren't familiar with it.

Notice how the "fi" and "fl" are joined in Figure 8-7. This is an example of ligature. Depending on where a letter appears in a word, it can behave differently. In fact, GX fonts can produce 16,000 context-sensitive *glyphs* per font. A glyph is the printed form of a given letter or character.

If you are thinking that all of this is just some sort of sensitive new-age flourish, then you probably don't deal with Near or Far Eastern alphabets very often. In Arabic, for example, characters such as *ha* can have multiple glyphs depending on where they are located in a sentence. Normally you would have to type some sort of key combination to call out these extra glyphs, but GX can produce them automatically.
For all of its wonderful capabilities TrueType GX may be a dead-end where fonts are concerned as Apple drops its support. This time Adobe and Microsoft have teamed up to produce OpenType. OpenType is based on Microsoft's TrueType Open font technology, which tried to address many of the same problems as TrueType GX. With Adobe onboard, this is an instant standard. It will also be completely backward compatible with Type 1 and TrueType.

**Font Basics**

**Installing and Removing**

After reading all of that history from the Middle Ages to the present, installing your fonts will come as a letdown. Simply drag the font files to your System Folder, the Mac will ask whether you want to put these in with your Fonts folder, and you say yes. That’s it, and that’s the way it has been for almost eight years now.

Removing fonts is almost as simple. First quit all open applications, then remove any unwanted fonts from the Fonts folder in the System Folder.

**Multiple Font Formats**

So with all of these different fonts floating around out there, which ones should you use? In truth, you can use any font you like. That is what most people do anyway. With Mac OS 8 you get several standard TrueType fonts. After that, you can install others to suit yourself. See Finding Fonts later in this chapter for more information.

If you install Type 1 fonts, you'll also need a copy of ATM. There are about a thousand different ways to end up with a copy of ATM, so this shouldn't be hard. First, ATM installs with almost any Adobe product from the Adobe Type Library to Photoshop. You can even install the
Adobe Acrobat reader and get ATM that way. Most likely you’ll find ATM available with the font you install. Many collections of Type 1 fonts include a copy of ATM. You can also buy ATM Deluxe discussed later in this chapter under Font Utilities.

A second word to the wise is to avoid installing both the TrueType and Type 1 versions of the same fonts. You could have the bitmapped, TrueType, and Type 1 versions of the same font installed if you aren’t careful. In addition to the confusion that will cause you when you clean out the Fonts folder, it also could cause conflicts between what you see and what you print.

Display and Print

The Mac sends font information to three places only: the screen, PostScript printers, and non-PostScript printers. Depending on which destination the Mac has in mind, it treats fonts differently. If you are using another device—fax software, for instance—it will behave as if it were one of the three devices above. Most likely, that will be a non-PostScript printer.

First, when you type, the Mac “prints” information to the screen. This happens much quicker than the printed page, but for your Mac the process is the same. For this example, say you are typing in Courier 12-point. What does the Mac do? It looks for a screen font in exactly that point size first. If there is a bitmapped font of Courier 12-point available at startup, then it uses that. If no screen font is available, the Mac resorts to TrueType and generates a screen font from the available TrueType Courier. If you aren’t using TrueType Courier, then the Mac queries ATM for a bitmap of the Type 1 version. If no Type 1 version of the font is available, then the Mac scales a substitute from the installed screen font for Courier in another font size, just like it did on the Mac 128!

You may say, “Oh yeah? Well, what if there is no screen font installed
either?” In that case, there never would have been a Courier available in the font menu to choose from.

The second case in which your Mac deals with font data is the non-PostScript printer. This could be any non-PostScript laser printer, a StyleWriter, a Deskjet, or even the original ImageWriter. Using Courier 12-point again as an example, the Mac first tries to find a TrueType font to use. If one isn’t available, then the Mac goes to ATM again and requests a scaled and pretty copy of the Type 1 version of Courier. In this case, ATM acts like a PostScript engine for your non-PostScript printer. Finally, your Mac will resort to printing whatever you have on the screen, and you get the bitmapped version of the font.

In the world of PostScript printers, the Mac uses whatever is installed in the printer first. That could mean that you were using TrueType Courier on the Mac, but PostScript Courier comes out on paper because that is what the printer has in its ROMs. The Mac ships the appropriate font over to the printer if the printer doesn’t have one. First it tries TrueType, then it tries PostScript. If neither of those formats is available, then Mac defaults to the old screen dump again and you get bitmapped fonts in all their jagged glory.

Font Substitution, or When Helvetica Ain’t Helvetica

Sometimes you get a document that contains fonts you don’t have. In this case, you see a substitute, often Helvetica or Courier, that is far from the mark. For one thing, fonts have different attributes such as width and spacing (see Describing Fonts in this chapter) that determine how they look on the screen. So in addition to a really ugly replacement to that sensitive, well-thought-out font in the original, you get sloppy layout and line breaks as well. The new font just doesn’t fit. Super ATM solves this problem by generating a substitute font of its own based on a table of common fonts. Adobe Acrobat is the big client for this ability and uses it to make documents appear the same from Mac to Mac or even platform to platform. Of course, if you stick to System fonts for your portable documents, you will never be shamed by font substitution again.
CHAPTER 8: FONTS

Font Specifics

Describing Fonts

Fonts have a variety of attributes you'll need to know if you plan to use them seriously. These describe the typeface in question and can greatly clarify a discussion with a client or graphic artist. Really, just how professional does "Make that squiggly thingy on the g longer" sound?

Fonts are described using a basic set of measurements: cap height, x height, descent, and baseline, as illustrated in Figure 8-8. Cap height is the height of the capital letters in a given typeface measured from the baseline. The baseline is the line on which letters rest; characters gjqpy descend below the baseline. Similarly, x height is the height of the lowercase letters measured from the baseline. The maximum distance any character in a typeface drops below the baseline is the descent.

![Figure 8-8: Cap Height, X Height, Descent, and Baseline](image)

A second set of terms describe the letters themselves. Figure 8-9 and Figure 8-10 illustrate the terms descender; serif, ascender; sans serif, counter; and width. Serifs tend to be what people most remember about a font. Fonts fall into three basic schools: serif, sans serif, and rarer semi-serif fonts. Serifs are those little ledges that sprout from some letters, as in H or A. Sans-serif fonts lack the serifs. Helvetica is a good sans-serif example. See Figure 8-10 for a sample of each. There also
exists a strange class of semi-serifed fonts that use serifs on some but not all of the characters that typically sport them.

Descenders and ascenders are the parts of the letters that stick up or drop down. Ascenders typically stretch from the X height to the cap height. Descenders drop below the baseline. The width of a character is the width of the character itself plus the width of the white space to the right that keeps it from bumping into its neighbor. The counter is that chunk of open space in the center of several letters such as e, o, or p.

Another distinction among font families is the display font. These fonts act as headlines and eye-catching phrases in magazines and on billboards. They are meant for use only in short sections of text. You probably wouldn't use one to typeset a book, but it would certainly attract more people to your next garage sale.
One final pair of distinctions are proportional and nonproportional fonts. Proportional fonts vary the width of the letters so they can fit together nicely. This works very well in most cases but can be a problem if you are loaded down with typewriter-era habits such as ending your sentences with two spaces following the period or lining up columns of text using the space bar. The columns just don’t come out even in a proportional font. You’ll find lots of data from UNIX and DOS systems suffer from this behavior.

You can use a nonproportional or monospaced font to clean up that situation in a snap, as shown in Figure 8-11. Monaco and Courier are two monospaced fonts you’ll probably find on your Mac. They may be slightly easier to read than some fancier fonts, but they are very clunky from a design viewpoint, and they don’t show off your Mac’s strengths.

Armed with this vocabulary, you can describe and differentiate among fonts. For example, you might start to notice that most billboard headlines are sans serif, whereas country-and-western bars tend to lean
heavily toward grossly serifed woodcut fonts. It can become addictive. Don't be surprised if you pay attention to the typeface and not the billboard on the ride home. "Hey," you can say to the rest of the car pool, "they used a proportional sans-serif display font on that billboard we just passed." It might not spark conversation on every commute, but at least you’ll say it knowledgeably.

**Font Problems**

Even if you know what you are talking about and where things go, trouble can still arise. The most common problems occur when you have a lot of fonts. Trimming those down will generally help. See Speeding Things Up later in this chapter for more performance tips.

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If you've never had so many fonts on your machine that you felt the effect, then consider yourself lucky. If you don't think a lot of fonts can slow you down, then heed these words of warning.

My wife and I left our house and computer in the care of a friend during a vacation in 1996. While we were gone, our Mac-savvy house sitter decided to look through a few hundred fonts and proceeded to install them on our machine. Upon my return I noticed something was amiss when I opened ClarisWorks and the entire machine froze. After waiting a minute or so, I restarted and got the same results. I called my friend in a panic.

"What have you done to my machine?"

"I just installed a few fonts," our house sitter replied.

That gave me the clue I needed and I started cleaning house. ClarisWorks would have eventually opened, I later found out. It just had to compile the 30 megabytes of installed fonts into the font menu first!
Jaggies are the number-one font-printing problem. The print has an unwanted jagged stair-stepped edge to it. This occurs for a number of reasons, and the result is just so, well, 1980s! The number-one cause is that you have a bitmapped font installed. Check to see whether you have the TrueType or Type 1 versions of the font and use those instead.

The next most likely suspect is ATM if you are printing to a non-PostScript printer. Remember that ATM does for your StyleWriter what it does for the screen: it converts your Type 1 fonts from a bunch of mathematical curves into a bunch of dots. These are the same dots that end up on paper. ATM can get corrupted or deleted or become incompatible with newer System software and printer drivers. Try reinstalling the most recent version of ATM you can find.

How do you find the latest version of ATM? Try www.adobe.com for starters, but you can also get a copy with just about any Adobe product from ATM Deluxe to Photoshop. In a pinch, it might be worth looking through a few of your font CD-ROMs or installing the Acrobat Reader from Adobe to get a copy of ATM.

Another common possibility is that you are printing from a paint program. SuperPaint, Colorit!, even Photoshop are paint programs, and text in one of these is always bitmapped text when it goes to the printer. One trick here is to work on a document twice as big as your output and print at 50 percent reduction, which makes any jaggies that are present half the size they would have been. See Chapter 19 for more graphics tips.

Rotating text will create jaggies on non-PostScript printers. To get a clean block of rotated text, you will have to work in a paint program and adjust document size and dpi (see above), use a drawing program such
as Illustrator or Freehand, or print on a PostScript printer.

Other common problems deal exclusively with Type 1 fonts. These fonts are the best from a prepress and printing viewpoint since they should never cause problems with PostScript printers. They can cause confusion, though, since they require corresponding screen fonts to work correctly. If you get confused about those screen fonts, renaming them or throwing out needed fonts can cause problems.

Another problem occurs when you send one font to the printer and another comes out. Though rare, that can happen. One possibility is that you have a Type 1 font installed on the printer and a similar, though different, TrueType variant on the Mac. You are seeing one thing on the screen and another on the paper because that's just what is happening. You are looking at the TrueType or bitmapped font and the PostScript font is printing. Make sure you have only one version of a given font installed.

Fonts can also become corrupted. Removing the fonts, restarting, and reinstalling should clear up any corruption problems. If a file in the Font folder has the same name as a Type 1 printer font, then the printer will try to load it whether it is Bookman or your hidden copy of Doom. As a rule, don't fiddle with the names of your fonts. Bad things happen.

**Portability—Embedding Fonts, Adobe Acrobat, and PostScript**

One of the biggest headaches fonts can cause relates to publishing and prepress work. You might send a document to the service bureau or client only to be told that it can't be opened. There are a couple of solutions to this problem. You can tell programs like Freehand or Illustrator to convert fonts to their outline data and do away with the need for a font altogether. Figure 8-12 shows an example of this option in Freehand. You can also use a font utility such as Font Sneak (see Font Utilities below) to gather the needed fonts.
Figure 8-12: Outline Font Option in Freehand

You might also consider using Adobe Acrobat if high-end output isn’t as important. Acrobat will write an interchange format called a PDF file that can be viewed on a variety of systems. It makes for a very Internet-friendly way to provide a catalog or brochure to customers and clients.

**TrueType GX, or “Dead Man Kerning”**

In addition to ligatures and glyphs that we’ve already discussed in Font History above, with QuickDraw GX installed you can do some amazing things with text such as *tracking*, *kerning*, and using *superscript* and *subscript* right inside any GX-savvy application. Tracking and kerning deal with the space between letters and along a line of text. See Chapter 18 for more information on these terms. Superscript refers to text above the baseline, like exponents used with large numbers such as $10^9$. Subscript deals with text below the baseline, such as $H_2O$ in chemical formulas. Normally, you would have to use a page-layout program or resort to key combinations to take advantage of automatic features like these.
You don't care if it is a dead-end? You just have to know more about the incredibly nifty tools and tricks QuickDraw GX can do for you? Well, try these resources:

The QuickDraw GX Fan Club: www.gxfanclub.com
This site has a font-of-the-month club, GX utilities, and cool developer and user info for QuickDraw GX.

Apple's GX Home Page: support.info.apple.com/gx/gx.html
This site will provide all of the official Apple word on GX as well as utilities and tools.

Unfortunately QuickDraw GX has been accepted by almost nobody. You can do some pretty nifty stuff, but you pay for that with system overhead. It is similar to GUIs (graphical user interfaces) in the earliest days of Macintosh. They ate up a lot of resources. QuickDraw GX is like that, and eventually all machines will grow into something similar with OpenType or a future technology.

On Mac OS 8, many features of QuickDraw GX have been disabled. Apple will not pursue it as part of its future OS strategy, so for the most part expect it to wither on the vine. Until then you have QuickDraw GX if you need it.

**GX Font Follies**

If you do give GX a try, there are a few things to note. GX can't play straight with your PostScript fonts. In System 7.5 and Mac OS 7.6, QuickDraw GX automatically converted any Type 1 fonts you were using to GX format when it installed. After that, you had to use the *Type 1 Enabler* program to convert them to GX format. Since Apple decided to let GX slide, it doesn't even convert your existing Type 1 fonts for you when you install it with Mac OS 8.
To convert existing Type 1 fonts to GX mode, you first need to install the Type 1 Enabler. From a System 7.5 or 7.6 disk, launch the QuickDraw GX installer and choose Custom Install from the pop-up box in the top-left corner of the installer window as shown in Figure 8-13. Click on the check box beside QuickDraw GX Utilities and click the Install button. On the Mac OS 8 disk, there is no Type 1 Enabler under the QuickDraw GX custom install option. Take it as a sign of things to come.
To use QuickDraw GX you'll need a GX-savvy application; otherwise, you won't have access to any of the nifty ligatures, text tools, or context-sensitive glyphs. These applications are fully compatible with QuickDraw GX shipping with Mac OS 8:

BareBones' BBEdit 4.0.4  
Cherwell Pro Fit 5.00  
ClaireWare Personal Log 2.10  
Microsoft Word 6.01  
Microsoft Excel 5.00  
NisusWriter 5.00  
PierceSoft ShareDraw 2.01  
Symantec Act! 2.50  
WorldSoft WorldWrite 3.0.1

To uninstall QuickDraw GX, you can simply choose the Remove option from the pop-up menu in the upper-left-hand corner of the QuickDraw GX installer you used to install the software. Though that will remove QuickDraw GX, it leaves your Type 1 fonts disabled. To re-enable them, first quit any open applications and open your Fonts folder inside your System Folder. Throw away any enabled Type 1 suitcases you find there. The Type 1 fonts in these suitcases will have three A's on them, just like TrueType fonts. After you have trashed any enabled Type 1 fonts, open the Archived Type 1 Fonts folder and drag the contents to your fonts folder in the System Folder. Throw away the empty Archived Type 1, ITC Bookman, New Century Schoolbook, and FTC Zapf Chancery plus...
the System fonts. Charcoal, the newest System font shipping with OS 8, is not included. Consult your printer’s documentation for a more complete list.

Those installed fonts are in the printer’s ROM. Note that printers have RAM as well. For instance, the affordable and useful Apple LaserWriter 4/600PS comes with 2 megas of RAM but can be upgraded to 6 megas. When you send a document to the printer, the font is downloaded, then stored. If you’ve recently used the same font, it may still be in RAM, and your printer is smart enough to use it without downloading it again. You can load fonts to your printer’s RAM using a special utility (see below), and they’ll stay put until you restart the printer.

Other printers come with hard drives attached. The same holds true for these as for RAM. After the printer has checked the ROM and the RAM, it looks on the attached hard drive. If your printer has this option and you want a serious speed boost, take advantage of it. You need the same special software for loading this storage with fonts.

The two most common tools for loading fonts to your printer are the Apple Printer Utility and Adobe’s Downloader. Apple keeps changing the name of its tool. Previously it was known as the LaserWriter Font Utility or Apple LaserWriter Utility. You get the Apple Printer Utility with your printer software, and Downloader comes free with many Adobe fonts. You can also find these items on the Internet.

**Speeding Things Up**

Even if you are getting along just fine with your fonts, you could do a few things to speed up your system. The big advantage to most of these tips is that they don’t cost much to implement. On the whole, they can be done by anybody.

First, trim the fat from your System Folder. Yes, I know you just love the way Arnold Boecklin (the font) looks, but when did you use it last? Purge thyself of all extraneous fonts. This is where one of the font utili-
ties listed below can come in handy. You can create sets of fonts for such specific projects as work, fun, newsletter, etc. This single change will greatly speed up your system's behavior if you have been carrying around 50 to 100 typefaces.

The second thing you can do is get screen fonts for the typefaces you use regularly. These will speed up your daily work environment, especially on a slower Mac. Remember, screen fonts are instantly available for the System to use when it needs them, so pages of text redraw faster. You already have screen fonts for most of the OS 8 System fonts.

Third, installing fonts to your printer will speed up printing. (See Loading Fonts to the Printer above.) This costs nothing if your printer can take advantage of it, and the speed increase for commonly used fonts should be worth the effort.

**Font Utilities**

There are several tools out there for managing fonts. The big three are Symantec's Suitcase 3.0, Adobe's ATM Deluxe 4.0, and Alsoft's Master Juggler Pro. In addition to these comprehensive commercial products, there are dozens of smaller programs, utilities, and shareware programs for dealing with fonts. Many of them are described below.

More... So where do you find all of these nifty toys?

Adobe Type Reunion: www.adobe.com (800-445-8787)

ATM Deluxe: www.adobe.com (800-445-8787)
Fontographer: www.macromedia.com (800-326-2128)
Font Sneak: members.aol.com/lakegroup/FSHome.html
Ikarus-M: www.urwpp.de - 800-229-8791
LetraStudio: letraset@esselte.com (800-526-9073)
Master Juggler Pro: www.alsoftinc.com (800-257-6381)
MenuFonts: www.dbldclick.com (541-317-0355)
Strata Type 3-D: www.strata3d.com (800-628-5218)
Suitcase: www.symantec.com (800-277-3948)
TypeBook: www.rascalsoft.com (805-255-6823)

FONT S
Adobe: www.adobe.com (800-833-6687)
Bitstream: www.bitstream.com (800-237-3335)
Comicraft: www.comicbookfonts.com (310-458-9094)
Emigre: www.emigre.com (800-944-9021)
Letraset: www.letraset.com (800-343-8973)

The Major Font Managers

ATM Deluxe: This is the powerhouse of font managers. Produced by Adobe, which invented the technology, ATM Deluxe lets you activate and de-activate fonts on the fly and adds a few secret abilities to your system. The biggest of these is anti-aliased screen fonts that should smooth out what you see on your monitor. Screen aliasing causes jagged
or unclear images. Anti-aliasing software and hardware reduce this tendency. You can also use ATM Deluxe’s Type Indexer to catalog your fonts or print a reference book of what they look like.

**Master Juggler Pro:** Alsoft’s Master Juggler Pro lets you keep your fonts out of your System Folder like other font managers, and it adds the ability to compress them to conserve space.

**Suitcase:** From Symantec Software, Suitcase lets you organize your fonts in much the same way as its competitors. You get a friendly list view and can drag-and-drop fonts into sets based on projects or certain applications. Do you use the same five fonts every time you open QuarkXPress? Suitcase can streamline the process for you.

**Font Designers and Construction Kits**

**Fontographer:** Have you ever wanted to create your own font or modify an existing one? Fontographer from Macromedia lets you manipulate and adjust any font you can lay your hands on. Additionally, you can blend typefaces or start from scratch on a whole new font all your own.

**Ikarus-M:** This is a professional type-creation program from URW that has been around longer than the Mac. It is designed so that an artist can create the type freehand while someone else enters it into the computer.

**The Other Utilities and Cool Tools**

**Adobe Type Reunion:** This Adobe product groups your font menu into families, collecting the various versions of Adobe Caslon, for example, into one entry. Otherwise your font menu would read “A Caslon light, A Caslon med, A Caslon Bold, etc.,” as it listed every version of the font you had installed.

**Font Gander:** Rascal Software’s Font Gander lets you create a refer-
ence book of your installed fonts or fonts from an uninstalled source such as your hard drive or a CD-ROM. It is indispensable for cataloging your collection and lets you browse your font library away from your computer.

**Font Sneak:** Deb Lake’s Font Sneak opens up a whole new era of worry-free trips to the service bureau for you. It has one mission in life: to open your QuarkXPress, Adobe Illustrator, or EPS files and collect the fonts they need for output. You never again need to worry about having the right fonts when you send your files to be printed.

**Illustrator and Freehand:** What! These are drawing programs! How did they sneak in? Well, you can convert text to paths in either program, allowing you to manipulate, stretch, and alter your type. You wouldn’t want to lay out a book in one, but you can certainly alter Palatino into an eye-catching display font for a headline.

**LetraStudio:** Letraset’s LetraStudio lets you manipulate type in “envelopes” and then save the envelope so you can recreate the same effect time after time. You can also add artwork from Freehand or Illustrator to create the perfect headline or logo.

**MenuFonts:** Talk about truth in advertising, Dubl-Click Software’s MenuFonts enhances your font menu. First, it groups fonts by family and lets you see what kind of font you are dealing with. It also prints the name of the font in the font itself and lets you view it at several different point sizes.

**StrataType 3-D:** If you need cool-looking 3-D letters for a project, then Strata’s StrataType 3-D may fit the bill. It lets you use any TrueType or Type 1 font to create fully rendered 3-D lettering. You can use one of the textures included from wood to chrome or import your own from a PICT file.
Finding Fonts

There are hundreds of thousands of fonts out there, and the list of suppliers here is only a general starting point. Seek and ye shall find.

Adobe: They're Adobe man. A-D-O-B-E! If they make it, you will come. They're Microsoft of the font world. 'Nuff said?

Bitstream: Less expensive than Adobe while providing good, solid work-a-day fonts.

Comicraft: Do you want an eye-catching pop-art font? Comicraft has one of the hottest collections going. In addition to cool display fonts, they also use font technology to letter such comic books as Astro City and Leave It To Chance.

Emigre: Providing cutting-edge fonts since 1984, Emigre has lots of tools to be cool with.

Letraset: Another font giant with trainloads of nifty display fonts just waiting for a home.

Shareware: Don't write off shareware fonts. Though some are garbage, others are truly great. Vote with your dollars and support the cool ones. At $5 to $10 each, they are an affordable way to build a working type library. Check out the online services and shareware CD-ROMs for these fonts.
TO GET THE MOST OUT OF TWO OR MORE MACS, YOU NEED TO network them. When you network computers, you connect them together so that they share information. Networking is another thing Steve Jobs got a peek at when he picked up the graphical user interface during his trip to Xerox PARC, and he made sure it got built into the Mac.

Every Mac on Earth has built-in networking. The ability to string computers together, share resources, play together, and swap files is as basic as the Mac itself. There are several different kinds of networking common to the Mac Platform from LocalTalk to Ethernet and cutting edge FireWire. Of course, setting them up and managing a network is as easy as anything else on the Mac. After reading just the first section of this chapter, you'll be able to use an existing network connection, and by the end of the chapter you'll be a Mac-networking expert. You'll soon be networking together every Mac you can find.

Network Basics

There are two skills to master: connecting to something and connecting something to you. As a Mac owner, your decisions are simplified, but you still have plenty of them. Deciding how to assign permissions and how to connect your network can be a challenge. All of these choices evolve logically from your network needs and demands. How much data do you need to move? How many machines will you be connecting? With these thoughts in mind you are ready to go.
Connecting to Someone Else

The first thing to do is to connect your Mac to someone else's Mac. Just assume for a moment you are already connected to a network. You may be. There are hundreds of thousands of Macs sitting on networks at businesses and universities across America. For a moment, assume your Mac is on one of these networks and other Macs are already connected with you. You'll get access to them from your Chooser in the Apple Menu. This is the very same Chooser you use to select a printer when you print.

When you open the Chooser, you'll see AppleShare in the upper-left-hand corner as shown in Figure 9-1. Selecting AppleShare brings up a list of connected servers as shown in Figure 9-2. In this case there is only one, named Lexcorp, but on a large network there could be dozens. To attach yourself to a server just double-click its name on your desktop. You will be asked to identify yourself as shown in Figure 9-3. If you know your password, then you can change it from here as...
Connect to the file server "Lexcorp" as:

- [ ] Guest
- [x] Registered User

Name: Sandy Clark
Password: [ ] (Two-way Scrambled)

Cancel Set Password OK

Figure 9-3: AppleShare Password Screen

well. Many times, you won't need a password at all. This is especially true if you are operating a smaller network or connecting machines within your home. In this case, select Guest and click OK.

You will be greeted by the server selection dialog box shown in Figure 9-4. Again, there is only one drive shown here, but every shared
drive on the networked Mac you connected to will appear. If you are connected to a machine with four other hard drives, then they'll be listed here. You can open this drive with a double-click or you can check the box to have it brought up every time you start the Mac. This is a handy way to stay connected to machines you use often at work. When you double-click the remote hard drive, it may appear that nothing happened. If you close the Chooser, you will find the drive out on the desktop as shown in Figure 9-5. You can treat this remote drive icon just like a regular hard drive. To copy files to it, simply drag them to the icon and drop them in. To open the remote drive, just double-click it. You will find that a networked drive performs slower than a drive connected directly to your Mac.

Hey!
Guess who showed up on the desktop!

LaserWriter 4/600
Dos Files
Kryptonite
Trash

Figure 9-5: Connected Server

That's all there is to it. No hidden traps or woes; just a single control from the Chooser and the common, everyday Finder. To the end-user, the network itself should be invisible. If all things are working properly, the users shouldn't need to know whether 10baseT Ethernet cable or magic pixies are carrying the shared data.
Connecting Something or Someone to You

If you aren't connected to a network already, then you ought to get connected if you can. The easiest network to set up is a connection between just two Macs. On any Mac you can do this simply with a single printer cable. Printers such as the LaserWriter 4/600PS can accept a network connection through your standard printer cable as well. First, plug the cable into both Macs. Before Open Transport, Macs were limited to using only AppleTalk through the printer port. With Open Transport, you can use the pop-up menu on the AppleTalk control panel, as shown in Figure 9-6, to change which port the Mac uses for your network. Once you've plugged in both machines, your network is technically up. If you have games that work across the net, then you can start blowing each other up immediately. On the other hand, if you have been illegally using that same copy of Photoshop or other software on both machines, then the party is over, as shown in Figure 9-7. If you have connected to a printer, then you will find it waiting for you in the Chooser as shown in Figure 9-8.

![Figure 9-6: AppleTalk Control Panel](image)
CHAPTER 9: NETWORKING

Could not initialize Photoshop because Christeen is already running a copy of Adobe Photoshop® with this serial number.

Figure 9-7: Duplicate Program Error

To connect just two machines with an Ethernet cable is almost as easy. There also are several printers on the market that will take an Ethernet connection. See the next section on network details for information on network speeds and the kinds of cables you can use. For our purposes, we are going to look exclusively at 10baseT Ethernet. This
flavor of Ethernet has connectors that look like overfed phone plugs. They are called RJ-45 connectors. If you have a newer Mac, you should see this port on the back. They are pretty much standard now on all but the lowest-priced Macs. We will discuss other Ethernet schemes in the next section of this chapter.

To plug two Macs directly to each other with 10baseT, you need a crossover cable. This cable is exactly like the Ethernet cables we'll discuss later except two wires crossover or switch pins. If you ask for a 10baseT crossover Ethernet cable, your local computer shop should be able to set you up. Some Macs have Ethernet but no 10baseT connectors. Instead they have AAUI jacks like the one shown in Figure 9-9. You need to plug an AAUI transceiver like the one in Figure 9-10 into this jack. One added advantage of a transceiver like this is that if there is a power surge, this little guy will take the bullet for your Mac. How loyal and faithful! Once you have the two Macs or a Mac and a printer connected with a crossover Ethernet cable, you need to select Ethernet from the Connect Via pop-up window in the AppleTalk control panel. After that, your connection works exactly like the LocalTalk connection above, only much faster.

With two Macs networked together like this, you can have some fun file sharing between them. This lets a user on another machine get access to your files. You can also activate program linking, letting someone out on the network run software on your computer. First you need to activate file sharing and give the outside world permission to use your Mac. Permissions to do things on your Mac are called privileges. These functions work the same no matter what kind of network you are using.

First, let's turn on file sharing. You can share just one folder or your entire drive. Since we know the other Mac in our two-machine setup
CHAPTER 9: NETWORKING

Not every network in the world exists to boost productivity, and much of the bandwidth on serious networks gets pilfered away for another pastime: games. For a quick networked-game experience on the Mac, check out the shareware Avara at www.ambrosia.com, or look into commercial software such as Close Combat at www.microsoft.com. Online games have been around on old mainframes long before the Mac, but the Macintosh was definitely the first home computer to support them. Today PC gamers are discovering online gaming.

In the last two years there has been an explosion in network-gaming hardware and networked games for the PC. The Mac was simply there first. Mac's built-in network made it inevitable. One of the most popular games by far was, and is, Bolo. Shown in Figure 9-11, Bolo is a cooperative tank game that runs on a Macintosh of very modest resources. You can place Bolo on older black-and-white Macs as well as on your latest power-hungry hardware. The objective is to work with other players in teams to take out enemy pillboxes and refueling depots. You can play it over a wide variety of networks, including the Internet, as shown in Figure 9-12. You will still find dozens of Bolo servers out there. See the official Bolo page at deckard.mc.duke.edu/bolo/ for more information on Bolo and where you can download it. Check out the rec.games.bolo news-

Figure 9-11: Bolo
group on Usenet as well. You can also do an Internet search and turn up dozens of other Bolo resources.

Of course, you may say, "So the Mac has a single lousy game? This is supposed to make me feel better?" Fear not, gamer, there are more than a hundred networkable Mac games. In fact, you can take your PC-toting pals to task by going head-to-head with them in 14 games including Quake, Warcraft I & II, Monopoly, NASCAR Racing, NetMech, Havoc, Doom I & II, Descent I & II, Close Combat, Command & Conquer, Chaos Overlords, Hexon, and Worms. As if that weren't enough, there are dozens more Mac-only games as well.

See the world's greatest resource for Macintosh network gaming at www.ambrosiasw.conetgames/home.html. In addition to fantastic information and links to download online and network games, you will find excellent Mac networking help there too. If the boss catches you, you can always say, "I was just using the resource-intensive demands of Marathon to test the limits of our network's stability and bandwidth, honest!"

intimately, we'll share the entire hard drive. If you are on a larger network and unsure who might be trying to get in, you will want to share a smaller portion of your drive. This may be just a single folder labeled Shared Folder.

To start file sharing on any drive or folder, click on it once to select it and then choose Sharing from the File menu. If file sharing is already
on, you will jump straight to privileges for that specific folder or drive. Let's assume for a moment that file sharing isn't on, which is the most likely case if you haven't used it before.

When you select Sharing from the File menu, you will be met with the dialog box in Figure 9-13. This message is simply telling you file sharing is off and offering to open the required control panel for you. You can also go directly to the File Sharing control panel in your Control Panels folder under the Apple Menu if you like. When it opens, the File

![Figure 9-13: File Sharing Alert](image)

![Figure 9-14: File Sharing Control Panel](image)
Sharing control panel looks like Figure 9-14. You can start file sharing and program linking by clicking the appropriate button. You can also change your Mac's identity on the network along with your name and password from this control panel.

Clicking on the Activity Monitor tab at the top of the screen brings up the controls in Figure 9-15. You can see who is connected and what they are up to from this window. In this case, Christeen is connected and there is a moderate amount of usage going on. You can kick people off by selecting them and then clicking the Disconnect button. You are
prompted for a grace period of sorts as shown in Figure 9-16. This is the amount of time before you actually give the user or users connected to your Mac the boot. This same dialog appears if you shutdown while other users are connected to your Mac.

Of course, if you are in a large computing environment, you don’t want every Tom, Dick, and Helen connecting to your machine anyway. Before you can set any privileges, you need to create some users from the Users & Groups control panel in Figure 9-17. From here you control who can connect, what they can do, and even how they do it. Click on the New User button and you get the opportunity to create a new citizen of your virtual community. You can name them, assign them a password, and decide whether or not you want to let them set their own password. You can also set their linking and sharing options from the Sharing settings reached from the pop-up Show menu at the top of the control panel. These settings are shown in Figure 9-18. In addition to all
Somewhere I hear cries of, "I'm in a hurry! Privileges be darned, I'm only connecting to my PowerBook anyway! My data doesn't contain nuclear launch codes, secret Whitewater papers, or anything else someone may steal. Get me connected!" If you need the fastest way to enable file sharing between two Macs, just enable the guest account to share files. Follow these steps:

1. Plug the Macs together with LocalTalk or a crossover Ethernet cable.

2. Select the appropriate port from the AppleTalk control panel and turn AppleTalk on in the Chooser as shown in Figure 9-19 and turn on file sharing from the File Sharing control panel.
3. Go to the Users & Groups control panel on one machine and double-click on Guest as shown in Figure 9-20.

4. Click the Allow guests to connect to this computer checkbox under the Sharing settings and close the control panel as shown in Figure 9-21.

5. Select the folder or drive you want to share and select Sharing from the File menu.

6. Click the Share This Item and its Contents checkbox and set the Privilege pop-up menus to read and write as shown in Figure 9-22. You can now select this Mac from AppleShare in the Chooser of your other Mac and connect as normal. Using the Guest account, you don't even need a password! After you set this up, you will be connected in minutes every time.
of these privileges, you can assign the user to groups if you have created them. Groups let you assign privileges to collections of people instead of individually. On a large network with scads of users, this can be useful.

To create a new group, go back to the Users & Groups control panel and click on the New Group button. From the window in Figure 9-23, you can name your new group. Add people to it by dragging them to the window. When you set permissions on individual folders or drives, you can control which groups get access as well as individual users. You have one final, special user. This is the guest user. With this user enabled, anyone can get access to your machine. It is sort of an open invitation and should be used only when you don’t expect strangers to be poking around. You can set permissions for guest as well, as we’ll see next.

After you have gone to all of the trouble of arranging privileges for your different folders and drives, be careful not to ruin your work with the Copy button on the Shared folder or Drive dialog box shown in Figure 9-24. This is the same dialog that comes up when you select Sharing from the File menu. If you select your hard drive and click Copy at the bottom of the window, your Mac will overwrite your privilege and sharing settings for all folders contained by that drive. Your Mac tries to warn you as shown in Figure 9-25,
but you may miss it. Be careful.

Also, if you plug your PowerBook into a network while you are on the go, you will probably want to turn off file sharing. If you leave the guest account active, you could be inviting anyone to come and wreak havoc on your hard drive.

To set your Mac's privileges, select the drive or folder for which you want to set privileges and select Sharing from the File menu again. Last time you got the message that let you turn file sharing on. Now that it is on, you get the window in Figure 9-26. You will want to click the Share This Item and its contents checkbox first. This turns sharing on for your selection in general. Then, from the pop-up menus below, you can select from the users and groups you have created as shown in Figure 9-27 and decide what privileges they get, shown in Figure 9-28. You can also set the privileges for the guest account here.
Network Details

To actually build a network for a small office requires more than just the skills discussed above. You also need to know the hardware side of the networking game and be able to speak some of the lingo. We’ll look at the underlying hardware that makes your network go in this section and look at some of the more useful tools you can find out there as well.

Talk the Talk

As you saw above, you don’t need to know any networking details just to get a couple of Macs to talk to each other. To create larger networks, you will need a bit more of the background and jargon.

First, the small networks we’ve discussed and most of what is covered in this chapter deals with Local Area Networks, or LANs. These are the machines in the immediate building or office you are in. Beyond that you will also encounter Wide Area Networks, or WANs. These networks generally cover larger areas that extend beyond a single building and rely on the telephone company or some other communications link to connect the separate LANs into a coherent WAN.

When network professionals think of networks, they think in terms of protocol layers. The 10baseT wiring can be one layer while the Ethernet protocol is another and your AppleTalk is yet again another. Generally, you decide on one set of protocols for each layer. These layers make up the network you use by figuratively stacking atop one another.

Take a look at Figure 9-29. The Ethernet network is carried by 10baseT cable.

*Figure 9-29: Ethernet Network*
AppleTalk is converted to Ethernet protocols in the Mac's built-in Ethernet hardware and carried on top of that. Another alternative that would produce the same result is shown in Figure 9-30. Here LocalTalk is carried over PhoneNET and the Mac's built-in networking converts the AppleTalk signals as they leave. To the end-user, it is transparent. She will click on AppleShare and interact with the connected servers the same way regardless of the underlying protocols.

On the Mac your choices are greatly simplified. You will most likely be using AppleTalk over an Ethernet or LocalTalk network of some sort.

In the software section below, you have several software resources for connecting your Macs and PCs. You might think it is a chore, but in fact the odds are in your favor several ways. First, 10baseT Ethernet offers you a common protocol to communicate with, and Mac Ethernet hardware is the same as PC hardware. You don't need two kinds of cables, two kinds of hubs, etc. Second, there are Macintosh software packages for both Novell and Windows NT. Windows NT's SFM, or Services for Macintosh, lets Macs on the network treat an NT server just like any other server. Finally, though they are rare now, you can still find the occasional PC LocalTalk card. They are expensive when compared to Ethernet equipment, but it may still be the solution for adding one PC to a large LocalTalk network. The bottom line is that there are options.
There is the lesser-used alternative to Ethernet called the TokenRing network. TokenRings form a complete circle and tend to be fast, but they are fading from the marketplace. With built-in Ethernet on more and more Macs, that is rapidly becoming the standard.

The most important choice you can make is how your network will be carried. This is the network cabling layer and it decides just how fast and how far your network can go. There is a physical limit to how far you can run a length of cable and still understand what's being said at the other end. Any kid who ever played with a soup-can telephone is familiar with this fact. The farther you go, the weaker the signal becomes.

Different cables also work at different speeds. The difference between PhoneNET and 10baseT is the difference between a rutted back road and a solid county highway. Generally, Ethernet is faster than LocalTalk, and 100baseT FastEthernet is faster than both of them. They are summed up in Table 9.1.

Table 9-1: Cables

<table>
<thead>
<tr>
<th>Cable</th>
<th>Max. Length</th>
<th>Speed</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple LocalTalk</td>
<td>1,000 feet</td>
<td>230K/second</td>
<td>This cable is either Apple's genuine LocalTalk connector or a printer cable strung between two Macs. You are limited to 30 devices on this cable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PhoneNET LocalTalk</td>
<td>3,000 feet</td>
<td>230K/second</td>
<td>This can be Farallon's genuine PhoneNET connectors or similar devices. Maximum cable length can vary wildly if inside telephone wiring is used. You can have as many as 30 devices on this cable. The PhoneNET connector plugs into your Mac's serial port and requires a terminator at each end of the network.</td>
</tr>
</tbody>
</table>
### Table 9-1: Cables

<table>
<thead>
<tr>
<th>Cables</th>
<th>Length</th>
<th>Speed</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>10baseT Ethernet</td>
<td>100 meters (3.28 feet)</td>
<td>10 Mbps/second</td>
<td>This is also called twisted pair and generally supports one device per length of cable requiring the use of a hub (which is discussed in a moment) for multiple machines. When ordering cable, request higher grade Cat 5 or Category 5 cabling. It is shielded better than standard cables and can be used for 100baseT networks discussed below.</td>
</tr>
<tr>
<td>10base2 Ethernet</td>
<td>189 meters (620 feet)</td>
<td>10 Mbps/second</td>
<td>This is sometimes called thin-wire Ethernet because it uses coaxial cable instead of the thicker, multi-conductor standard Ethernet cable. Supports up to 30 devices.</td>
</tr>
<tr>
<td>10base5 Ethernet</td>
<td>500 meters (1,640 feet)</td>
<td>10 Mbps/second</td>
<td>Sometimes called thick-wire Ethernet, this cable layer uses stiff, thick 3/8-inch-diameter cable with a 15-pin connector. Supports up to 100 devices per segment.</td>
</tr>
<tr>
<td>100baseT FastEthernet</td>
<td>250 feet</td>
<td>100 Mbps/second</td>
<td>Supports only a single connection per segment. There are two standards, 100baseT4 and 100baseTX. You need completely different equipment for each, and neither is compatible with the other cables above. 100baseTX is generally more available.</td>
</tr>
</tbody>
</table>

Notice the measurement of speed changes from pokey "K" for kilobytes when dealing with LocalTalk to Mbps or millions of bits per second for Ethernet. This is known as Bandwidth, or how much traffic the network can support. Ethernet is worlds again faster than LocalTalk. Also, it is possible to combine 10base2 and 10baseT cabling provided you have a proper hub that will accept both inputs. This isn't a bridge, technically, since the Ethernet protocol is the same. It is only a change in the kind of wire used in the bottom protocol layer.
Finally, you may need other hardware to make your network work. With LocalTalk, simple PhoneNET connectors are all you need. For more complex 10baseT and 100baseT networks, you may have to add hardware. Typically you will need to add an Ethernet card to every Mac that does not have one already. If you are using Macs with an AAUI port, then you will need to add an appropriate transceiver like the ones from Asanté shown in Figure 9-31.

![Asanté Transceiver](image)

You will probably need a hub as well. With 10base2 and 10base5, you can string Ethernet directly between machines just like LocalTalk PhoneNET. You even need terminators on each end. This kind of a network is called a daisy chain. With 10baseT, the game changes a bit. You first need to string your cables to a central hub, which passes the signals between them. This is called a star topology, a fancy way of describing the physical shape of a network. You will need a hub with 100baseT as well, but the two kinds of hubs are incompatible.

From this point, you can add other devices to your network to handle specific functions. These can do everything from knitting different networks together to bringing the Internet onto the wires.

**Repeaters** can extend the distance your network can grow. For example, if you wanted to run a 10baseT cable farther than 300 meters, then you would want to add a repeater near the end of the run. You
could then add another 300 meters of 10baseT beyond that. *Bridges* can allow communication between two different kinds of networks. For example, the Sonic MicroPRINT bridges like the one shown in Figure 9-32 can link your LocalTalk and Ethernet networks together. Other models can even pass TCP/IP data, letting the entire network have access to the Internet. You can also add 10baseT to 100baseT bridges to link your newer and older Ethernets. Bridges also often provide the links to other LANs in a WAN. These connections between different networks are sometimes called *gateways*.

Servers are machines dedicated to providing one location for files or services. Up until now we’ve discussed networking individual machines in what is called a *peer-to-peer* network. On some networks, several CD-ROMs will be attached to servers and provided to everyone on the network. In other cases, a single machine will become a *file server* and act as a central repository for files on the network. In other cases, one machine can act as the *print server* and spool files bound for the printer. This speeds things up by freeing other machines faster. Your Mac can send its data for the printer almost instantaneously and get back to doing other things.
Internet can be added to an entire network with a bridge, or router. Internet routers direct Internet information from the machines on your LAN out onto the Internet. The details are somewhat beyond the scope of this book, but in general, you will use some sort of high-speed service such as ISDN or DSL (digital subscriber line) to make the connection. Each machine on your network gets an IP address, which is something like a street address on the Internet. When you sit down at one of the Macs, it is already online, all the time.

For added protection you may want to add a firewall between your network and the Internet. Firewalls let you control what information gets passed into or out of your office and can protect you from some attacks on your network. Apexx Technology Inc. makes a product called Team Internet shown in Figure 9-33. This black box is a combination firewall and email server that can handle TCP/IP and mail traffic for Macs and PCs on the same network.

Figure 9-33: Apexx Technology Team Internet
Walk the Walk

When you set up a Mac network larger than just the Mac-to-Mac networks we looked at in the first of this chapter, you will need to decide what kind of network to use. You can pretty much settle on AppleTalk through Open Transport for the topmost layer of your network. You already have that built in to Mac OS 8 or System 7.6. Older versions of AppleTalk should work seamlessly on your network as well, so that decision is made for you.

The next decision is to choose a cable and communications layer. The easiest way to pick this is to determine what you already have on your Macs. Most newer Macs have built-in Ethernet. All Macs have built-in LocalTalk. If all of your Macs can use the same network hardware, consider yourself blessed and start hooking them up.

A simple LocalTalk network will look like the one in Figure 9-34. In this case PhoneNET connectors are plugged into the Mac printer ports. Phone lines connect the individual PhoneNET connectors, which are terminated at each end. You can even use existing home or office telephone wiring, with a few caveats. First, you must have a free pair of wires running through your home or office telephone wires. If you have only one phone line, then this is probably the case. The PhoneNET con-
Connectors get plugged into the wall and see each other through your existing wires. You can even add a printer to a LocalTalk network as shown. The Apple LaserWriter 4/600 is a good solution for a small or home office and comes with built-in LocalTalk.

For a simple Ethernet, you will need a hub. You can then wire all of your computers into a hub as shown in Figure 9-35. This is a speedy solution and is generally several dozen times faster than LocalTalk. As hubs become more affordable and Ethernet comes standard on more Macs, look for these networks to become more common. If you plan to add a printer, make sure it supports Ethernet directly. Most higher-end Apple printers, such as the 12/640 PS Plus shown in Figure 9-36, will support a direct Ethernet connection.

If you need more speed than LocalTalk, then plan to upgrade to 10baseT Ethernet. This may mean that you wire part of your machines with Ethernet and use a bridge to

**Figure 9-35: Ethernet Hub**

**Figure 9-36: Apple LaserWriter 12/600 PS Plus**
DON'T MIX AND MATCH CABLES! You may notice that your phone line and RJ-45 Ethernet cables look a lot alike. For that matter, so does an ISDN cable, and heck, we are even using phone lines to carry LocalTalk through PhoneNET connectors. Your telephone line is powered, and the ring-voltage that surges through the line when you receive a call can wreak havoc with your Ethernet cards and hardware. You could blow the Ethernet out of your motherboard by plugging up the wrong wires! Be careful. The same goes for LocalTalk as well. Be sure you aren’t plugging into a hot outlet when you wire your PhoneNET connectors.

add your LocalTalk machines, or it may mean you have to add an Ethernet card or SCSI adapter to your existing LocalTalk machines. For truly media-hungry graphics and multimedia, you will want to jump up to 100baseT. The only way to add this functionality is with a card, and few Macs come with it built in. Luckily, they are easily installed and available now.

If you decide to add the Internet to your network, you can do so easily with Ethernet. Generally, you will plug your bridge, router, or high-

![Figure 9-37: Ethernet Hub](image)

*Figure 9-37: Ethernet Hub*
end communications device directly into the Ethernet hub as shown in Figure 9-37. For extra security you can add another computer called a firewall between the bridge and the rest of your network as shown in Figure 9-38. This solution provides extra security and piece of mind for the network administrator.

Of course, you don't want to leave your LocalTalk network out in the cold. Look at the larger network in Figure 9-39. This network combines a LocalTalk and Ethernet network seamlessly. Your Ethernet machines can all see and print to the devices over on LocalTalk with the Chooser along with the machines on the Ethernet with them. All users on the LocalTalk machines would use AppleShare under their Choosers to see the Macs on the Ethernet. With the addition of a Sonic MicroPrint TCP/IP LocalTalk bridge, the LocalTalkers could use the Internet as well. Not all LocalTalk-to-Ethernet bridges support TCP/IP, so don't assume it will work. Make sure you ask before you buy.
Spend the Cash

There are many devices you can use to expand your network. We'll look at a few specific examples and prices of Mac-networking hardware in the following section.
Network Cards

Some Macs don't come with built-in Ethernet, and almost none of them come with built-in 100baseT Ethernet. To add these abilities, you will probably want to add an Ethernet card. Adding cards and RAM to your Mac is covered in Chapter 11. If you aren't afraid of opening the case on your Mac and poking around, you can save yourself about $25 to $30. You can find cards from Sonic, Asante, and Farallon easily. Prices range from around $50 to $70 for basic Ethernet, up to $250 for FastEthernet 100baseT cards. If you don't have card slots, you can add a SCSI Ethernet adapter to your Mac's SCSI port. The Asante Micro EN/SC and Desktop EN/SC shown in Figure 9-40 can connect your SCSI devices to your Ethernet for about $180.

Figure 9-40: Asante MicroBridge

AAUI Connectors

If your Mac has built-in Ethernet, then there is a good chance it has an AAUI adapter. To use the Ethernet capabilities already there, you need a special AAUI adapter called an Ethernet transceiver like the ones in
Figure 9-41. Notice how these Asanté transceivers give you the option of adding several different Ethernet types to your Mac. Expect to pay $30 to $90 for one of these, but the cheaper ones probably will do fine.

**PhoneNET and LocalTalk**

You used to have only one option for LocalTalk cables, and those were genuine Apple LocalTalk adapters and cables. They were expensive and are seldom seen today. Farallon drove them from the marketplace with their smart, sensible, and efficient PhoneNET connectors. Genuine PhoneNET connectors will run around $15, and generic or third-party connectors can be found for about $7 each. These usually work just as well. The main differences are usually cosmetic. For example, a cheaper PhoneNET clone may have a naked resistor for a terminator.

![Image of Asanté Transceivers](image)

*Figure 9-41: Asanté Transceivers*

**Hubs**

To connect 10baseT networks together you need a hub. You can also find LocalTalk and other networking hubs. Any hub acts as a junction allowing multiple machines to talk to one another through the hub. Prices can range from $60 for a small four- or five-port hub to hundreds of dollars for large multiport or FastEthernet hubs. You can use any hub
with the appropriate network connection in your Mac. For example, any 10baseT Ethernet hub will work with your Mac network. There are no PC-specific or Mac-specific hubs out there.

**Bridges**

Bridges will vary in price depending on their purpose and function. Sonic and Infowave make LocalTalk-to-Ethernet bridges. In addition, Sonic’s MicroBridge TCP/IP will support your Internet data as well. Expect an ISDN bridge to cost around $500 with full ISDN Internet routers costing only a few hundred more.

**Cables**

Cables are the cheap end of networking in most cases. Look to pay $5 to $30 for 10baseT cables and less than $10 for phone lines to use with PhoneNET connectors.

In addition to hardware, several networking tools can expand your network with software. These tend to let you share devices and information with other machines or networks. Sometimes this software offers speed enhancements as well.

**PC-to-Mac**

There are several software products in this family with varying features and abilities. These include DAVE from Thursby Software Inc. that uses cross-platform TCP/IP to connect your Mac to Win 95 and Win NT systems at around $100. For around $250 Infowave’s PowerPrint Pro can make almost any PC printer available over a LocalTalk or Novell network. Miramar Systems makes several networking products for Mac and Windows in its PC MACLAN software packages. Look to pay from $110 to $170 for them.
NetDoubler

For around $60 Asante’s NetDoubler shown in Figure 9-42 will increase the speed of your Mac network. Reaching an acceleration of up to nine times previous performance in some cases, NetDoubler works on Mac 10Mbps networks and faster. Windows NT and Unix clients are also available.

![NetDoubler](image)

Figure 9-42: Asante NetDoubler

Apple Remote Access

Apple’s Remote Access software lets you dial into an existing AppleTalk network with your modem. For all intents and purposes, you are part of the network no matter where you actually are. You can print, copy files, and share information just as if you were physically connected. Look to pay around $125 for a personal server and client and $60 for additional clients.
Other Shared Devices

Stalker Software makes a variety of tools for sharing Macintosh ports and devices over your network. SCSI Share lets a single Mac share SCSI devices such as scanners or high-end printers over a network. PortShare Pro lets any Mac share any serial-port device like a modem or directly connected printer. They also make an integrated modular messaging system called CommuniGate that can be used to handle everything from email to faxes.
how printing works

WHEN YOU FIRE OFF A REPORT, GRAPHIC, OR MEMO TO YOUR printer, what happens? In Chapter 6 you learned that you could change your printer selection with the Chooser. When you do, you tell the Mac a lot about how to treat data once you choose the Print... command under the File menu. Your data will be treated differently with different types of printers. In general, printing is controlled through a series of options and menus from the System level. This means that once printing works, it should work the same way everywhere and in every application. The ⌘ + P key combination will print a file from any application and ⌘ + ⌘ will cancel a print job in any application.

To cover it all, this section of the chapter is subdivided as follows:

1. The Physical Connection
2. Selecting a Printer
3. Background Printing
4. From Application to Printer
5. Page Setup
6. The Print Menus

There are several steps to setting up a new printer. You hook the printer up, select it in the Chooser, and print from your applications. You have many other options that influence printing in the Page Setup menu located under the File menu in most applications. Finally, you get
even more options from the dialog that appears when you select Print from the File menu in any application. We will cover all of this in the following pages. As complex as it sounds, nine times out of 10, your simple print command works without putting any thought into it.

The Physical Connection

A direct connection to your printer is the most common occurrence. When you print to a directly connected printer, the information makes one short hop down your printer cable to the printer you are using.

On the back of your Mac you will notice a port with a tiny picture of a printer above it, as shown in Figure 10-1. This is a serial port, and there are two of them on most Mac models. They are discussed in detail in Chapter 1—Meet the Mac. This port will accept any cable with a DIN8M connector on it. Most Mac printers will come with the cable you need. Just plug one end into the port and the other end into the printer. You can switch which port your printer uses from the Chooser under your Apple Menu as shown in the Selecting a Printer section below.

![Figure 10-1: Rear of Mac Printer Port](image)

Networked printers are becoming more common. Apple's LaserWriter 4/600 shown in Figure 10-2 is a good example. When you print to it, the information travels out of your Mac onto an AppleTalk network. The LaserWriter 4/600 can be connected to your Mac only using a LocalTalk cable. Of course, if you are using just a single Mac, then you probably don't do a lot of networking with it. Luckily, you can use the same
DIN8M cable in a pinch. In this case you will have networking on but be directly connected to the printer. In fact, the cable will be plugged into the very same printer port you used for a directly connected printer.

The advantage of a networked connection becomes clearer when you have several Macs and a single printer. Figure 10-3 shows you a typical

![Typical PhoneNet LocalTalk Connector Plugged Into the LaserWriter 4/600](image)
PhoneNet LocalTalk connector plugged into the LaserWriter 4/600. By adding a printer to your existing Mac network, you give every machine the ability to print to it. The more expensive the printer, the more network options it is likely to support. It isn't uncommon to find printers with Ethernet (a networking protocol) support built right in. For more details on networks, see Chapter 9—Networking.

To select a printer on a network, you must have AppleTalk on and the proper printer driver installed. You just can't talk to that networked LaserWriter with your StyleWriter software. The Mac will remind you of this fact and activate AppleTalk if possible when you select the printer from the Chooser. Again, see Choosing a Printer below for more information on the Chooser.

The larger your network is, the more likely you are to encounter a print server. A print server is a machine dedicated to doing nothing but handling files bound for the printer. The print server shown in Figure 10-4 is a high-end machine dedicated to handling PostScript printer files. All this computer does is queue print jobs for the printer. After you send the print command, your job goes here and waits patiently for its turn at the laser printer. This frees up your Mac and lets you get back to work.

![Figure 10-4: High End Print Server Computer](image)
Printer sharing is the poor-man’s way to add a printer to the network. It works well for printers that don’t normally do networked printing, such as an original StyleWriter or many other low-end inkjet printers. Typically, you plug the printer in as you normally would, and then you run software to make that printer available to other Macs out on the network. In effect, your Mac becomes a print server. There are two products worth noting in this capacity. GrayShare from Apple and Stalker Software’s PortShare Pro let other Macs on the network print to your printer. Additionally, GrayShare improves Grayscale printing on Apple inkjets such as the StyleWriter II. PortShare Pro lets you make other devices attached to your printer or modem port available to the network as well.

Selecting a Printer

First, a refresher course on that Chooser. You met the Chooser in Chapter 3—Finder and Menus. Your Chooser’s contents will vary depending on which printer drivers you have installed, but it should look similar to Figure 10-5. Each icon represents a printer driver in your System

![Figure 10-5: Chooser Contents With Printer Drivers](image-url)
Folder or some other communications resource such as AppleTalk or your *fax driver*. Fax and printer drivers behave the same way. They tell the Mac what to do with data after you type ⌘ + ⌘ or choose Print... from the File menu.

The Chooser itself is fairly smart and tries to spot and solve problems for you. For example, it warns you if you need AppleTalk to use the selected printer as in Figure 10-6; it gives you a choice of serial ports as in Figure 10-7; and when you are done, it reminds you to update your application's settings for your new printer as in Figure 10-8. As smart as that is, it still lets you do some pretty dumb things to yourself, including

*You must turn on AppleTalk to share this printer. Click OK then turn on AppleTalk in the Chooser.*

*Figure 10-6: Chooser AppleTalk Required Warning*

*Connect to:*

- AppleShare
- LaserWriter 8
- StyleWriter 1200
- <Serial Port>
- <Serial Port>

*Figure 10-7: Chooser Choice of Serial Ports*
You have changed your current printer. Please choose "Page Setup..." in all of the open applications.

Figure 10-8: Chooser Update Application Settings Message

printing to the wrong printer. See Solving Print Problems below for more information on these problems.

After selecting a printer, the setup option will give you a chance to select a PPD or Printer Description, as shown in Figure 10-9. Your Mac will try to find the proper PPD for you if you choose the Auto Setup option on this menu. Choosing the Select PPD... button
gives you the selection menu in Figure 10-10. Simply select the appropriate driver. This file tells the Mac anything it needs to know about the printer from the kinds of paper options it supports to what trays are loaded. These PPD files are kept in the Printing Preferences folder inside the Preferences folder in Mac OS 8.

![Current Printer Description File (PPD) Selected: "LaserWriter 4/600 PS"](image)

*Figure 10-10: PPD Selection Menu*

**Background Printing**

No matter what kind of printer you choose, you are increasingly likely to be using some form of *background printing*. When background printing is active, you regain control of your application quickly while the chore of talking to the printer itself is handled by another program. Background printing usually involves writing your information to the hard drive to await printing, which is known as *spooling*.

Originally, background printing was a function of a program called PrintMonitor. When you printed a document, it spooled to disk and waited for PrintMonitor to send it to the printer. This collection of documents waiting to print is known as a *print queue*. Today, background printing is handled through *Desktop Printers*. Originally an option of QuickDraw GX, Desktop Printers has been an integral part of the Mac OS since version 7.5.3. Figure 10-11 shows several installed desktop printer icons.
CHAPTER 10: HOW PRINTING WORKS

With Mac OS 8, simply selecting a printer in the Chooser creates a Desktop Printers icon and activates background printing. When you print, the document automatically spools to the background. By double-clicking the printer icon on the desktop, you can examine the contents of your print queue as shown in Figure 10-12. You can start, stop, or reschedule print jobs from this window.

To save time, you can even drag-and-drop files onto the printer icon to add them to the print queue. This is especially handy when you want to print several documents at once. Your Mac automatically launches the appropriate applications to print your documents and spools the print jobs. You can also print PostScript files directly to the printer without launching any applications.

![Figure 10-11: Several Installed Desktop Printers](image)

![Figure 10-12: Print Queue](image)
Desktop Printers can save you lots of time in a couple of ways. Later you'll see how to save a PostScript file using your print command. You can print this file to an installed PostScript printer simply by dropping it on the appropriate Desktop Printer icon. Do you have a set of rules or regulations you need copies of on a regular basis? How about a form you are constantly printing? Save this as a PostScript file and then print all of the copies you want by simply dragging-and-dropping the file on the desktop printer.

Desktop Printers gives you the ability to print many different documents at once with a minimum of fuss. By simply dragging-and-dropping several different documents on a Desktop Printer icon, you tell your Mac to print all of them. You need confirm the print command only once to print several different documents. The Mac even launches the appropriate applications for you.

From Application to Printer

Depending on the printer you have selected in the Chooser, the Mac sends one of two types of data from your application to the printer: PostScript or QuickDraw. The printer then uses this information to rasterize the data from your Mac into dots. It may spool this file to disk with some form of background printing so your application can get back to work. Finally, the printer puts dots on paper, and you are done.

PostScript is the more professional and cross-platform standard for printing. As a rule, a PostScript printer will cost more than a QuickDraw printer for a couple of reasons. First, there is the licensing fee to Adobe who created the technology. Another factor is the hardware involved. PostScript printers have their own built-in microprocessors, memory, and sometimes even hard drives. This makes your PostScript printer a computer in its own right.
Your PostScript printer follows a page description written in the PostScript language that creates the final printed output. A sample of this raw PostScript language is shown in Figure 10-13. If you knew what you were doing, you could even write PostScript code by hand. Programs such as Freehand or Illustrator use the PostScript language to generate the graphics they create. This makes their output optimal for printing on a PostScript printer.

Three levels of PostScript printing are available: PostScript Level 1, PostScript Level 2, and PostScript Level 3. You will find very few printers running the older PostScript Level 1 technology. This was Adobe’s flagship standard introduced in 1985 and unchallenged until the release of Level 2 in 1993. PostScript Level 1 lets you send complex graphics and data to the printer, where it is rasterized (converted to dots on paper) by a PostScript Interpreter and Raster Image Processor, or RIP. You’ll see more about RIPs in the Printing Someplace Else section below.

PostScript Level 2 gave users many new printing abilities. Level 2 enhances printer halftoning, device-independent color support, faster rasterizing, fax support, file compression, and faster printer memory allocation. It is just plain better. The color and halftoning advances help your printed output, but they also

Figure 10-13: A Sample of Raw PostScript Language
open up the world of Display PostScript, which is Adobe's version of PostScript for monitors. The addition of fax support has turned many PostScript printers into fax machines as well.

In 1997 Adobe released the next level of PostScript printing. PostScript Level 3 opens new cross-platform abilities. The Apple LaserWriter 8500 in Figure 10-14 is one of the first printers to have built-in PostScript Level 3 support and lets you print PDF files directly from the print driver. PDF files are read by the Adobe Acrobat Reader and contain all of your color, formatting, and layout information. Acrobat files can then be sent across the Internet and opened on any platform. See Chapter 17—Working the Internet for more on Adobe Acrobat.

PostScript Level 3's other abilities include enhanced color printing, WebReady printing, and the broadest range of printing abilities ever. In fact, PostScript Level 3 was designed for a networked world. With
WebReady printing, Adobe has poised PostScript Level 3 to take advantage of the HTML (hyperText mark-up language) already coded into a growing number of Web pages.

For more information and ongoing discussions of PostScript, you might try the newsgroups comp.lang.postscript or comp.sources.postscript. For information on PDF files, Adobe Acrobat, and Adobe PostScript Level 3, visit www.adobe.com.

QuickDraw printers rely on the Mac to do their rasterizing for them. Your Mac has a built-in graphics engine based on QuickDraw that has not changed significantly since 1984. It converts the information you print from data to dots and then sends it to the printer. This means a QuickDraw printer can be cheaper since it doesn't need its own built-in brain. Your Mac does all the work.

Since they operate differently, PostScript and QuickDraw printers have different strengths and weaknesses. You already know that QuickDraw printers tend to be a bit cheaper. They also do a great job of printing text, TrueType and, with Adobe Type Manager, Type 1 fonts. See Chapter 8–Fonts for more on this feature. QuickDraw printers also do a good job of printing graphics from paint programs and some drawing programs.

QuickDraw printers fall short of the mark when trying to print graphics from PostScript drawing tools such as Freehand or Illustrator. To perform that task well, you may want to add a tool such as Brimy PowerRIP to convert PostScript to QuickDraw. See the Print Tools and Utilities section below for more information on this program. Either way, you'll slow your Mac down since it has to do all the work to process a printed page.

PostScript printers do just about everything well. They are fast, do a phenomenal job with graphics, and provide more cross-platform support than QuickDraw printers. When you install a PostScript print driver, you even get the option of creating a generic EPS or encapsulated PostScript file that can be printed on any PostScript printer. The only drawback it might have is the price.
One final note on printing under QuickDraw GX, which is on its way out at Apple. Originally it was billed as the next big integration of fonts, display, and printing. It was a resource hog and with Rhapsody on the horizon, development of GX became redundant. Additionally, PostScript Level 3 and OpenType fonts will be duplicating some of GX’s abilities.

With Mac OS 8 and QuickDraw 1.1.6, Apple has integrated the printing functions of GX under the standard Macintosh printing architecture. What does this mean in English? If you have a pure GX application, you need to upgrade to a more recent version that will print under Mac OS 8. Hybrid applications still will work, and now everyone gets the advantage of desktop printers discussed under the Background Printing section above.

**Page Setup**

Those print drivers you elect in the Chooser influence what options get displayed in your Page Setup menu. You will find Page Setup...as an option under File menu in any application that will let you print. The one shown in Figure 10-15 is from ClarisWorks, but it would be the same menu in SimpleText or any other program. It shows you the printing options available from the LaserWriter discussed next.

![Figure 10-15: ClarisWorks Page Setup Dialog for LaserWriter 4/600 PS](Image)
LaserWriter

In this case the options were supplied by the Apple LaserWriter driver. Though the exact options in this menu may vary from printer to printer, yours should look similar.

From this menu you can change the paper size or apply a few simple printer effects. The Orientation option lets you rotate your output 90 degrees. This is especially useful for spreadsheets and other wide output. You can Reduce or Enlarge your output by entering a number into the given box. To make your smallish graphic larger, for instance, type 200 into the percent box. Your picture will be twice as large. If that would make it bigger than the printer can handle, your Mac will warn you, as in Figure 10-16.

![Figure 10-16: Image Too Large Warning](image)

There are several Printer Effects available as well. These have evolved in name only over the years, and many of them are mostly irrelevant today. The Font Substitution effect is sometimes called Substitute Fonts. This option heralds from the earliest age of PostScript printing. Macs everywhere were rampant with bitmapped screen fonts from Apple (Monaco, Geneva, or any other city-named font) while the Adobe equivalents (Courier, Helvetica, etc.) printed much smoother. See Chapter 8–Fonts for more on this. The Font Substitution effect told the Mac to replace bitmapped fonts with Type 1 fonts when it could. Today your TrueType fonts print as well as Type 1 fonts in most cases, making this option moot.
The Text Smoothing (sometimes Smooth Text) option will occasionally help clean up output from a paint program. It is supposed to wipe out jaggies but works only on Apple printers. Even then, your results will vary. The final effect, Faster Bitmap Printing, has been mercifully removed from the LaserWriter 8 menu. On an older Mac with an older printer, this would speed graphics along by preprocessing files on the Mac before heading to the printer. Today this option will actually slow down the print job.

If you click the Option button, you get an entirely different set of choices shown in Figure 10-17. Again, this varies depending on the driver installed. You will find these choices under the Visual Effects pop-up menu item on the LaserWriter 8 Page Setup menu. It is worth the confusion though. These options work better than the Printer Effects previously discussed.

![LaserWriter Options](image)

*Figure 10-17: Second Options Button Choices*

As you click the first two options on and off, you send that little critter known as Clarus the DogCow (see sidebar) into spins and tumbles. Both the Flip Horizontal and Flip Vertical are used for mirroring your printed output. This can be useful when producing film or transparencies. The Invert Image option creates a negative of the original image that is also useful when printing to film and transparencies.
What exactly is that little animal on these printer effects menus? It looks like a dog. It's spotted like a cow. It is Clarus the DogCow! Clarus was an unnamed icon hidden in the Cairo font on the original Mac 128. This unlikely mascot has spawned buttons, shirts, technotes, and a lot of playful banter. For the complete story on this icon of Macintosh culture, go to devworld.apple.com/dev/dts/history.html. —Sandy Clark

The Precision Bitmap Alignment option can actually make your output look worse. It is another leftover from earlier times when 72-dpi bitmaps didn't print well on 300-dpi LaserWriters. These bitmaps would generally be images from a paint program. This option shrinks the bitmap by 4 percent to create a cleaner-looking image. Today, if you use it, the bitmaps shrink but the text remains the same, changing all of your alignment and spacing.

If you remember only one of these settings, make sure it is the one for Larger Print Area. On every LaserWriter driver before LaserWriter 8.4, it expanded the print area to within one-quarter inch of the paper's edge. Otherwise, your printer would save memory by clipping the artwork without first warning you. From LaserWriter 8.4 on, the driver automatically activates this option. If you aren't using LaserWriter 8.4 or later, you should use it also.

**LaserWriter 8**

Figure 10-18 shows you the Page Setup menu offered by the PostScript Level 2 printer driver LaserWriter 8 from Apple. This is the LaserWriter Driver included with Mac OS 8. From the Page Attributes section of this menu, you can set the page orientation and paper size in much the same way as with the LaserWriter. Selecting the pop-up menu box in the top-left corner of this menu lets you switch between Page Attributes and the PostScript Options menu shown in Figure 10-19. These work just like the LaserWriter printer effects discussed above.
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LaserWriter 8 Page Setup

Page Attributes

Format for: LaserWriter 4/600 PS

Paper: US Letter Small

Orientation: [Portrait] [Landscape]

Scale: 100%

Cancel OK

Figure 10-18: Apple LaserWriter 8 PostScript Level 2 Page Setup Menu

LaserWriter 8 Page Setup

PostScript™ Options

Visual Effects:
- Flip Horizontal
- Flip Vertical
- Invert Image

Image & Text:
- Substitute Fonts
- Smooth Text
- Smooth Graphics
- Precision Bitmap Alignment
- Unlimited Downloadable Fonts

Cancel OK

Figure 10-19: PostScript Options Menu
Inkjet Page Setup

For the most part, your inkjet printer's Page Setup window will look like those for the LaserWriter. Depending on the model printer and the driver you install, though, you could have some special abilities lurking under Page Setup in your File menu.

Look at the Page Setup dialog for the StyleWriter 1200 in Figure 10-20. Notice that in addition to Paper Size and the Orientation options, you have a Layout and a Border option. When you select these, you tell the printer driver to print multiple pages to one sheet of paper as shown in Figure 10-21. Notice that if you select 4 Up the tiny representation of your printed page sprouts three extra copies of Clarus the DogCow.

Clicking on the Watermark button brings up a menu of options for placing a watermark on your document. A watermark is a faintly printed message, icon, logo, or warning behind the text of your document, as shown in Figure 10-22. Your inkjet printer driver may provide you with similar features.

![StyleWriter 1200 Page Setup Dialog](image)

*Figure 10-20: StyleWriter 1200 Page Setup Dialog*
When you decide to actually print something, you are confronted with one of several printer dialog boxes. These dialogs are completely dependent on the printer you have selected in the Chooser. They appear the moment you type ⌘ + P or select the Print... command from the file menu.

The Print Menus

Figure 10-21: Multiple Pages on Single Page Display

Figure 10-22: Sample Watermark Printer Setting
Inkjet Print Menus

The dialog box in Figure 10-23 is from a StyleWriter 1200, and it illustrates your standard print options on most inkjet printers. Some items here will be the same on every print dialog you encounter.

![StyleWriter 1200 Print Options Dialog](image)

Figure 10-23: StyleWriter 1200 Print Options Dialog

Notice the buttons on the right. The Print button starts the actual printing of your document. Notice that this button is highlighted with an extra border. As discussed in Chapter 3–Finder and Menus, you can either click on it or hit the Return key to activate it. If you want to navigate these menus quickly, the keys `⌘` + `P` followed by `⌘+P` will start a print job with a minimum of fuss and bother on every printer. Of course, then you would miss all of the options your printer driver supplies you.

The options to print multiple copies or a range of pages are universal. Use your tab key to navigate among them without ever taking your hands from the keyboard. The number you enter in the box to the right of the Copies: option determines how many copies of the same document or range of pages you generate. This can be a big timesaver if you plan on giving your output to several people or you want 50 fliers for
your garage sale. The Pages: option lets you print either the entire document by clicking the All radio button or just a certain series of pages by clicking the From: radio button. If you click From: and type 3 in the first box and 6 in the second box, then you will print pages 3 through 6.

Did you already send that print job to the printer and then decide you needed extra copies? If you are using Desktop Printers in Mac OS 8, you can add extra copies of your print job quickly from your printer's print queue. Just double-click on the printer icon on your desktop. You should have a window that looks like Figure 10-24. Select your print job with a single mouse click and select either Duplicate from the File menu or type $$+D$$. Repeat as many times as you like to add more copies to the print queue.

![Figure 10-24: Print Queue Display](image)

You can also use this process to print a single page in a long document. This can be very handy when you are working on anything over a few pages long. Just enter the same page number in both boxes. If you needed to proof page 28 for example, then you enter 28 in the From: and To: boxes. When you select the Print button or hit Return, you get a single copy of page 28.

The Print Quality: selection is found on printers where you can control the output of ink or toner. This lets you print a faint draft copy to conserve ink and then select the highest quality for your final draft.

On several different printers you will have the option of selecting
Printer Type: on this menu. You will need to consult your printer's documentation to find out what special papers and films it can print on, but a few common choices are Plain paper, Coated paper, Transparency, Back Printed paper, and Glossy paper. The option Plain refers to standard paper. The Coated, Back Printed, and Glossy options refer to special papers for your printer. The Transparency option prints clear transparent film for overhead displays. Generally, Back Printed papers provide the highest quality color. Since all of these special papers cost more, it is good advice to print on plain paper for drafts and use special papers only when you are sure you have what you want.

The next option is Image: with Grayscale or Black and White selections. Generally, you can print in black-and-white for drafts, text, or line art. This will speed up things a great deal. Grayscale printing lets you print different shades of gray by changing the pattern of dots on paper. This gives you higher quality photos and pictures but takes more print time.

Sometimes you want to know when your printing is finished. Maybe the printer is located on another floor or in another room. The Notification: option lets you select a sound or menu to notify you when your print job is complete.

LaserWriter Print Menus

The print options with the LaserWriter driver in Figure 10-25 are very similar to those for the StyleWriter discussed above. This dialog box will be similar for any other laser printer you install. In fact, the Copies: and Pages: options as well as the Print button all work the same way.

The Cover Page: option lets you add a page identifying your output at the printer. If you share a laser printer with 30 coworkers, this can be a blessing. In some larger organizations, cover sheets may be used by an attendant to separate your job from others and place it in an output bin.
Paper Source: lets you tell the printer where to look for a sheet of paper. On some models, you may have multiple options here for different print trays or sources. You can load some printers with several types of paper and envelopes and then switch among them from your Mac. The Manual Feed radio button shown here is a common choice for printing a single sheet of letterhead or an envelope.

The Print: option is similar to the Image: option on the StyleWriter above. You can choose between faster black-and-white printing or more photographic grayscale printing. Use black-and-white for drafts, text, and line art.

With PostScript installed, you get a special ability. You can output to a PostScript file instead of paper with the Destination: option. When you select it, the Print button becomes a Save button, and clicking it gives you a standard menu for saving a file shown in Figure 10-26. This PostScript file can be printed on any PostScript printer. See the Printing Somewhere Else section below for more on PostScript files, and read the Shortcut sidebar in Background Printing above for handy tips on how to use them with your own Mac.
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LaserWriter 8 Print Menus

If you have Mac OS 8, then your only PostScript LaserWriter option is probably the powerful LaserWriter 8 driver. You may also have installed this driver with a previous system update or the disks that came with your printer. This driver provides you access to the abilities of PostScript Level 2 printing with the window in Figure 10-27 which pops
up when you print your document. This window makes good use of pop-up menus. The Printer: option lets you select from the installed PostScript printers. On most machines this will be a single printer, but if you have access to a network, several could be available. At the bottom of the menu you can save your settings, freeing you from changing them every time you print.

The Destination: options let you send output to either a printer or a file. Just like the LaserWriter driver, selecting File changes the Print button to Save. By clicking on the pop-up menu labeled General in this example, you can access more options for saving a PostScript file. We will discuss them below.

There is a lot of information in this window under the pop-up menu labeled General. When you first print with the LaserWriter 8 driver, this may appear confusing. The pop-up menu options are General, Background Printing, Cover Page, Color Matching, Layout, Error Handling, and Save as File. Each one provides you specific controls for that aspect of PostScript Level 2 printing.

Under the General pop-up menu you will encounter the options you already know. You can tell the printer which pages to print and how many copies you want. Like the LaserWriter driver before it, you get a Paper Source: option. There is an added twist with this driver though. You can select two different paper trays for the same job. This is an excellent option if your printer is loaded with both letterhead for a cover sheet and plain paper for the body of your document.

The Background Printing option shown in Figure 10-28 gives you several ways to control when and how your file prints. First, with the Print in: option you can change whether the print job spools to disk. This is good for fixing some show-stopping errors we’ll discuss under the Solving Print Problems section below. You can also schedule print jobs for a specific date and time. This is handy when you want to delay large print jobs until you are gone for the day or a time when the printer isn’t likely to be busy.
The Cover Page option is identical to the same option under the LaserWriter driver above, but Color Matching shown in Figure 10-29 offers you some new selections. With the addition of color in the PostScript Level 2 standard, you can select where your printer gets its color information. You can use the standard Color/Grayscale setting or you can select between Apple’s ColorSync software and Adobe’s Postscript for color matching. Color matching is used to match what
you see on the screen with what you scan into your computer or print out of your printer. Color matching is discussed further in Chapter 19—Graphics.

Figure 10-30 shows you the Layout options. These options can save hundreds of trees if you use them correctly. One option lets you print smaller versions of your pages called thumbnails so you can proof your work. You can print as many as 16 separate pages on one sheet of paper. Notice that the Pages per sheet: is set to print four pages. The picture on the left side of the window shows you a page with the numbers 1-4 in the pattern your printed pages will take. Make use of this when checking layouts or proofing drafts.

![Figure 10-30: PostScript Print Layout Options Dialog](image)

Your Error Handling options are shown in Figure 10-31. They can be helpful in tracking down the dreaded PostScript errors discussed under the Solving Print Problems below. Having a printed record of a PostScript error can go a long way toward solving it.

One of the most powerful features of the LaserWriter 8 printer driver is its ability to print your work to a PostScript file. These Save as File options are shown in Figure 10-32. First, you can choose to save a stan-
Figure 10-31: Print Error Handling Options

Figure 10-32: Save as File Options

dard PostScript file for the printer or an EPS or Encapsulated PostScript file in Mac or PC compatible format. These EPS files can be opened or imported into graphics and layout programs such as QuarkXPress or Photoshop.
Figure 10-33 shows some of these options in action. The EPS file that is about to be generated here will include all of the fonts needed to print this job except for the standard fonts installed with Mac OS. This Font inclusion: option can be a powerful way to generate a document for your service bureau or some other destination that might not have your same software and fonts.

**Color Print Menus**

Up until now we’ve discussed Grayscale and black-and-white printing. Color printing adds a few new twists to the menus. Figure 10-34 shows the Print menu for the Color StyleWriter Pro. Again, even if you are using a different color printer, your menu should be similar. Most of the settings are familiar and work exactly the same as on the other printers discussed above. These options include Copies: and Pages: settings that are identical to those on every other printer. Likewise, the Notification:, Image:, and Paper Type: settings are similar to those on the inkjet printers discussed above.

One important setting with respect to color printing is the Print Quality: option. Color-printing supplies generally cost more than inkjet
or laser printer cartridges, so printing in draft mode for your proofs can save you a lot of color ink in the long run.

A click on the Color button brings up a window in Figure 10-35. The Halftoning Options: are the same as for the black-and-white inkjet above offering the pattern and scatter settings. More important for color printing is the Emphasize Black checkbox. This enhances the black text and other accents in your printing that may be too light against brightly colored output. The ColorSync option engages Apple’s ColorSync software for matching screen colors and printed output.
Clicking the Utilities button from the Print menu brings up the window in Figure 10-36. These utilities can be used to keep your printer in order. The Clean print head before printing option is fairly self-explanatory. Sometimes the tiny holes in your printer get gummed up. These options let you clean just the black nozzle or all of the colors. The Super Clean wastes a lot of ink but gets the job done. Similarly, just like priming a hand pump, your print heads have to be prepared after you install new ink cartridges with the Prepare new print head before printing option. The Check alignment before printing option lets you make sure your color heads are all aligned correctly. Improperly aligned color heads will cause problems when your Mac tries to dither a certain shade or color combination for you.

![Figure 10-36: Utilities Options From the Print Menu](image)

Once you've sent your information to the printer, the last step is to see if the dots on paper look like the dots on your screen. See Solving Print Problems below for more on what to do if you don't get the results you want.

**What to Print on**

Picking the right printer for the job is a chore that almost every Mac owner faces at least once. Let's face it, a computer without a printer is rather the exception in this day and age. Chapter 23—Shopping will give you plenty of resources for buying your printer, and Chapter 2—Finding a Mac covers some of the basic home-office considerations. What we'll
discuss here are the different abilities, costs, and features of a few common printer types.

In general, speed and *dots per inch*, or *dpi*, are the two primary printer considerations. Speed is usually measured in *pages per minute*, or *ppm*, and this figure varies wildly. Some industrial-strength, high-end workgroup printers can shoot pages out in excess of 20 ppm. The printer's resolution is determined by how many dots will fit into an inch of printed page. The more dots, the higher the dots per inch. The higher the dpi, the better your printed page looks. Your dpi can range from early 72-dpi ImageWriters to the 1800-dpi Laserpress 1800 and beyond.

The other major consideration is color or black-and-white. For home and office use, the cost of color has plummeted over the last few years. Color is getting to be so common that colorless brochures, resumes, and documents can look downright cheap by comparison.

**Dot Matrix Printers**

In the beginning there were *dot-matrix printers*, fairly primitive devices that slam metal pins against ink-soaked ribbons. This drives ink into the paper and creates your printout. If you look in your local antique shop, you'll find hundred-year-old typewriters using similar technology.

In general, speed on dot-matrix printers is measured in *characters per second*, or *cps*, instead of pages per minute. The only dot-matrix printer still being sold for the Mac is the ImageWriter II shown in Figure 10-37. *This workhorse* has been part of the Apple line since the days of the Apple II. If well-tested technology is your thing, then this is your ticket.

About the only real use for these printers is for multipart forms, payroll checks, and the like. You just can't print tractor-fed or carboned papers on laser or inkjet printers. If this is a serious consideration for you, you have two options. Either see Chapter 23, then shop around for an ImageWriter, or check out the Print Tools and Utilities section below.
for software and tool kits such as PowerPrint that will let you print on any PC-compatible printer. You can still find dozens of dot-matrix printers for the PC platform. This is universally handled through your Mac’s QuickDraw capabilities. Look to pay around $150 to $200 for a dot-matrix printer.

**Inkjet Printers**

Apple’s Color StyleWriter shown in Figure 10-38 is now the base model inkjet printer made by Apple Computer. This trend toward color is sweeping the entire inkjet printer business, so look for simple black-and-white inkjets to become the exception to the rule. Inkjets have become the default printer of many households, and anyone with light to moderate printing needs should consider one.

Inkjets work by spraying tiny dots of ink onto paper. Color inkjets have multiple spray heads to handle the different colors plus black. When an inkjet prints, it dithers to create the effects of shading or different colors. Dithering is done by printing patterns of colored dots similar to those in your Sunday comics.
You can get inkjets in a variety of resolutions, but 300 dpi is about standard. There are both QuickDraw- and PostScript-compatible inkjet printers. In short, inkjets have replaced dot-matrix printers as the common, workhorse printer to which all others are compared. You can pay from $150 to upwards of $3,000 for an inkjet printer, depending on the features and resolution.

**Laser Printers**

The *laser printer* was a key component of the Mac's first killer application, desktop publishing. Laser printers work by using a laser (or with similar but different technology, a light-emitting diode) to fuse toner to paper in much the same way as a photocopier does. Laser printed pages look better than inkjet pages in most cases, and laser printers are often faster. There is also a large selection of laser printers for the multi-user, workgroup environment that sport add-on components such as sheet feeders, multiple paper trays, and envelope feeders.

The laser printer in Figure 10-39 shows you a pretty good example of a 600-dpi standard laser printer. Almost universally laser printers for the Mac are PostScript devices, though you can find non-PostScript laser printers. Additional features on laser printers can range from more RAM, greatly enhancing your speed and PostScript performance, to an attached hard drive for storing fonts. (See Chapter 8–Fonts for more on this ability.) Without a doubt, a laser printer is the best way to go for fast, clean, and efficient black-and-white work.

![Figure 10-39: Standard 600-dpi Laser Printer](image-url)
Color laser printing tends to lag behind black-and-white laser printing in both price and performance. When compared to some of the color printing methods discussed next, laser color can be downright disappointing on any affordable color laser printer. Even the term affordable is a stretch at the $4,000-plus price tag on these machines.

Look to pay anywhere from $200 for a used 600-dpi laser printer or the similar LED technology to $700 for a basic 600-dpi PostScript printer. From there, you can add dollars as fast as you can add features and abilities.

One thing that has become easier is label printing. You can now buy laser-printer-ready labels for almost anything from a videocassette to a Zip disk. Be careful running them through your laser printer, though. Most laser printers have the option of opening a special door or tray for printing envelopes or labels. This creates a straight print path through the printer. If you goof and don't follow the instructions for your printer, your labels could come off inside the machine. If your printer doesn't have a good, flat option for printing labels you might consider one of the dedicated label printers in the Print Tools and Utilities section below.

Thermal-Wax Printers

When you need versatile and attractive color printing, thermal-wax transfer makes good sense. There are two types of thermal-wax printers. The first uses rolls of plastic film coated with the colored wax. This wax is melted onto the page one primary color at a time. The second type is known as a phase-change thermal-wax printer. Again, wax is melted, but with these printers, the wax comes in individual colored sticks. The printer melts the wax and applies it in a spray.
Both printers have to dither colors in a similar manner to the inkjets already discussed. They also tend to be fairly slow. The printer has to make a single pass over the paper for each color.

There are a couple of things to keep in mind when shopping for a thermal-wax solution. First, many of these printers require some form of special paper. Plain-paper printing costs extra and takes longer when it is available since the printer needs an extra pass to treat the paper. If you plan to do a lot of black-and-white work as well as color, the phase-change models make better sense. Since they use only one color at a time, you don't waste as much wax and can replace the black cartridge as needed.

Sometimes the technology will be used alongside dye-sublimation (discussed next) as in the PrimeraPro Elite pictured in Figure 10-40.

![Figure 10-40: PrimeraPro Elite Printer](image)
Dye Sublimation Printers

The highest-quality color printouts you can get are from dye-sublimation printers, or dye-sub printers. They don’t just melt or spray pigment onto paper, they vaporize it. The vaporized dye is considered sublimed, hence the name. This gas penetrates the surface of the paper and creates the image on the page.

The color quality is higher because dye-sub printers don’t have to dither like their thermal-wax and inkjet cousins. They blend exactly the color you need creating a photographic-quality printout.

The dye-sub market is further subdivided into two broad categories: page proofing and image proofing. Page-proofing dye-sub printers contain PostScript abilities and are used to proof printed pages or generate final desktop output. The image proofers generally lack text capabilities and are used to proof photo and image work.

Prices have fallen a great deal on these printers. A simple photo-sized dye-sub printer like the one shown in Figure 10-41 costs less than $400. Again, as with most computer equipment, the sky is the limit and $10,000-plus dye-sub printers aren’t uncommon.

Figure 10-41: Simple Photo-sized Dye-sub Printer
Imagesetters

The Imagesetter should be considered the final word in print quality. In fact, all of the rules change when talking about them. They are included in this list because they are so important to such a large number of Mac graphic shops and specialists. You probably don’t own one, but you might use one at a service bureau, and who knows, with the way prices fall you may own one yet.

An Imagesetter can output to paper in some cases but usually prints to film. This film is used to create plates for printing, and the quality is exceptional. The Imagesetter uses a laser to generate a piece of film for each of the colors cyan, magenta, yellow, and black. Low-end Imagesetters can generate paper output, but film is the rule.

Imagesetters don’t even rate the same resolution measurements of the other printers we’ve discussed. Instead of dpi, you rate an Imagesetter by lpi, or lines per inch. The standard has been 133-lpi but recent advances have started it creeping toward 150-lpi. For comparison, your trusty 600-dpi laser printer rates only 50-lpi by Imagesetter standards. This fact, along with the price, is enough to make anyone cry.

Printing Someplace Else

Sometimes you just don’t have the tool for the job at hand. When this happens, you will find yourself heading down to your local print shop or service bureau. You can take your files from QuarkXPress, Freehand, or whatever and see to it that they get printed to a glossy high-quality page. You can print to a variety of devices in one of these shops from high-quality Imagesetters to more common dye-sub or laser printers. Many will bind, duplicate, collate, and generally organize your output for you in any way you like. The versatility it gives the home-office worker or small business is amazing.
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What Can You Print Where?

You can print files in a variety of formats from Adobe Illustrator to QuarkXPress at most shops or even send raw PostScript files straight to the printer. There are several things to be aware of if you want this process to go smoothly. These range from basic assumptions about what a print shop can do to what files you include with your print job when you send it out.

PostScript files give you the ability to save your print job as a single file that you can print on any PostScript printer. This file contains a description of your printed page that doesn’t require your software application to print. This is especially useful if you don’t know what software will be waiting when you get to your local print shop or service bureau.

You can save a PostScript file from within an application or use a PostScript printer driver to save the file, as shown in Figure 10-42. See The Print Menu under How Printing Works for more information on saving a PostScript file from here.

Figure 10-42: PostScript Printer Driver to Save PostScript File
The biggest drawback of a PostScript file is that you can't change it. A PostScript file saved out of Freehand isn't the same as a Freehand file. That's the problem of sending one to the service bureau. If you find a problem after you get there, you can't open the file to fix it. Even when you do save a PostScript file, there is no guarantee that the RIP (raster image processor) on the other end will print it. Many things can cause a PostScript file to choke the printer, from embedded files and fonts to simple errors in the file itself.

Of course, you can always just print your file in Freehand, PageMaker, or whatever you worked in. If you were just printing several dozen pages of straight text set in the Times font, then this solution would be straightforward. Unfortunately, the more complex the print job, the less likely this is to work. There are simply too many variables to assume the file will be printed in the format you have.

Believe it or not, your service bureau might not have a copy of the software you used to create your documents. Call first and make sure the company can actually use the file format you have. They may suggest an alternate format or a selection from your application's Save As option in the File menu.

Also, have you remembered to bring all of the files you need? Many programs rely on pictures or fonts being available on the disk you print from. In QuarkXPress for example, you don't actually look at the high-quality 600-dpi photograph on the screen, only a 72-dpi place holder that Quark stuck there. That is what makes your QuarkXPress file so small. It isn't wasting disk space by saving those huge TIFF, EPS, and JPEG files over again. If you take it elsewhere to print without these files, you will get jagged, lumpy, 72-dpi images instead of what you expect.

The same thing goes for fonts. Everyone might not be using Comicraft's Double Back font or have a copy available. Your application will substitute something atrocious in its place. You don't know how bad this can be until you see a beautiful ad's display font replaced with type-writer-like Courier.
CHAPTER 10: HOW PRINTING WORKS

Making Print Jobs Go Smoothly

When you first decide to work on a job, ask yourself whether you will be able to produce the finished output with the printer at hand. If the answer is no then you can do several things while you work to make your final printing of the project a breeze.

Talk to your service bureau or print shop first and know what its requirements are. They'll be glad to tell you what software they can print from and which applications they have on hand. Many service bureaus have a worksheet for you to fill out that details the specifics of your print job and outlines the shop's policies and procedures. Get this document and know it well.

Keep a list of every font you used in the job. Fonts are one of the big killers of resumes, business cards, fliers, and newsletters. After you have spent hours making sure your resume looks great, you can be crushed when all of the nifty arrows and bullets you used print as X's and A's because you forgot one font. You need to restrict yourself to the fonts you know your service bureau will have or include the fonts it needs to print the job. Try to use PostScript fonts if you have them. Some older Imagesetters will choke on TrueType fonts.

Treat images the same way. Keep a list of which ones and which versions you used. Make sure that you have all of the images you need before you send a job off to the service bureau or head down to Kinko's. Don't assume that because it looks good on your screen, it will work on another one. Try opening it on another machine in the office if you can and see what breaks. Also, avoid PICT files. Your Mac loves them, and Imagesetters despise them.

Another simple step to error-free print jobs is an attention to detail when completing the work order at the service bureau. Just saying you used Garamond in your document isn't enough. Specify it was Type 1
Adobe Garamond. Don’t just say you used Freehand, it was Freehand 5.5. Service bureaus can use information like this to troubleshoot problems and track down errors.

Make sure you leave them plenty of ways to contact you as well. Sometimes a problem can be resolved with a simple question. Don’t give them one phone or fax number when you can give them several along with the times you’ll be there. Organize your work as well. Don’t include extraneous files or previous versions of the document. Make sure everything is included and add a list of instructions, images, and fonts to the folder as well. The more information you provide the more likely you’ll get what you want.

Print the job on your own PostScript printer, if you have one, before you send it to the service bureau. If you can’t print it, then they can’t print it. If you can, try printing it from another machine in the office using just the files you had planned to give the service bureau. That may sound paranoid, but it is the best way to discover that you forgot a graphic or font.

Finally, talk to the staff and ask questions. You will usually be given guidelines on how to submit a job. Beyond that, the staff of your local Kinko’s, service bureau, or even school computer lab may know their equipment better than you do. Use that experience and ask questions. For more PostScript tips, see the PostScript error solutions in Case 3 under Solving Print Problems.

Solving Print Problems

You never choose the print command hoping for an error. When you type ⌘ + P you expect paper to come flying out of something. Unfortunately, that isn’t always the case. The reasons print jobs fail range from the embarrassing to the cryptic. Case by case, here are some common and not-so-common ones.
CASE 1 - Your Printer Can’t Be Found.

If you find yourself getting error messages similar to the ones in Figure 10-43, don’t panic. There is usually an embarrassingly simple solution. All this error means is that the Mac can’t see the printer. Sometimes your Mac will even suggest a solution like Make AppleTalk active and try again. Check the following:

1. Is the printer turned on?
2. Is the printer plugged in?
3. Are the printer cables or network connections plugged in?
4. Do you have the proper cable installed for your printer?
5. Do you have the correct printer selected in the Chooser?
6. If this is a networked printer, is AppleTalk on?

The questions above should lead you to a solution most of the time. If they don’t, try the more arcane and drastic solutions below.

There are even more possibilities for a dumb mistake with networked printers. Is the printer you are looking for connected to the Ethernet or a LocalTalk network through your printer port? You can change the net-
work your Mac sees from either your Open Transport Control Panel or the Network Control Panel, depending on which version of the System and networking software you have installed. Make sure to check the appropriate controls for your network. See Chapter 9—Networking for more information if you can’t see the networked printer at all.

If none of the possibilities above turns out to be the problem, try printing again and then try restarting. Shut down and turn off the computer and printer and let them sit for several seconds. This will clear anything that might still be in the memory of your PostScript printer. Turn the printer on first. After it has come completely on and cycled through any shifting of rollers and shuffling of print heads that are part of its startup process, restart the Mac. This makes sure the printer will be visible to the Mac. Sometimes, if the printer isn’t on when the Mac looks for it, it won’t see it. Try printing again.

If you still can’t see the printer or the printer still can’t be found when you go to print, follow the instructions for your printer and try reinstalling your printer drivers.

CASE 2 - Your Printing Is Clipped or Cut Off.

Your Mac will warn you if you try to print something that has a larger print area than the paper you have specified. You can either change the paper size if your printer supports it or scale your selection to fit the page. If the image is getting clipped and you aren’t being given a warning at all, the cause is probably the Larger Print Area option found in your laser printer’s Page Setup window. To change this setting, follow these instructions, which may differ slightly depending on your printer:

1. From within the application you are printing, go to the File menu and select Page Setup...
2. Click on the Options button on the right side of the window.
3. Click the button labeled Larger Print Area (fewer downloadable fonts) as shown in Figure 10-44.

4. Click the OK button in the upper-right corner of the window.

5. Click the OK button on the Page Setup window

6. Try printing again.

This should clear up the problem. If it continues, see if there is an obstruction or problem with the printer itself by printing a page of pure text. If clipping continues, it could mean there is a problem with some component such as the laser printer's print drum or the print head on an inkjet printer. Try printing to another printer if you can or swap out your toner cartridge and see if that corrects the problem.

**CASE 3 - You Get a PostScript Error.**

An error message like the one on Figure 10-45 means the PostScript interpreter in your printer has not been able to process the file. There are several things that can cause PostScript errors, so be prepared for a process of elimination. The first thing you'll need to determine is exactly which of two types of PostScript error you have. You can either have a memory-related problem or a problem with the Postscript code itself.
PostScript Memory Errors

You have a memory-related PostScript error if you see any error message displaying the code -8993 or using the words memory, limitcheck, or VMstorage in the message. The permanent solution to a problem like this is to add more RAM to your printer. Also, upgrading to PostScript Level 2 may solve the problem if that is an option on your printer. Level 2 printers manage the memory they have more efficiently than older PostScript Level 1 printers.

Processing all of those complex graphics and fonts can chew up a lot of RAM. For a quick fix, try the following in this order:

1. Turn off all printing options under Page Setup... in your File menu. Take a look at Figure 10-46. Larger Print Area, Text Smoothing, and the like may not be needed for your print job. If so, they could be wasting the RAM you need.

2. Turn off background printing and try again. With the LaserWriter 8 driver, you can do this from the Background Printing menu on the Print options window that pops up
when you select your print command. This is shown in Figure 10-47. On most other laser printer drivers, you should be able to turn background printing off from the Chooser under your Apple Menu as shown in Figure 10-48.

3. Print part of your document. Try pages 1-5 or even just page 1. This may be slow, but it can get your work on paper faster than the next solution.

4. Try simplifying your document. Did you use 30 fonts? Try fewer. Each font adds to the amount of RAM needed to print the page.

Figure 10-46: Page Setup... Printer Options in the File Menu

Figure 10-47: LaserWriter 8 Background Printing Menu in the Print Options Window
**PostScript File Errors**

Other PostScript errors are the result of bad code or commands in the PostScript file itself. These can occur for all sorts of reasons. Look for any of the following culprits first:

1. Graphic formats can cause problems. Check your document for PICT files and EPS files. EPS files become dangerous when you embed them within each other. For example, did you create a graphic by placing one EPS within another to create your killer logo? For the PostScript interpreter in your printer, all of those redundant PostScript commands can get confusing. Try saving that out as a different file format and replacing it in your document.

2. Avoid scaling large images down to tiny sizes in your document. This forces the printer to do all of the work rescaling your image. Resize the image in the graphic program of
your choice, such as Freehand or Photoshop, save it out, and then bring it back into your document. As a general rule, the closer to an image's final format you can get before using it in a layout program such as PageMaker or QuarkXPress, the better.

3. Turn on the Split Long Paths option in Freehand, Illustrator, or other PostScript drawing tools. This setting can make complex graphics easier to print. Follow these directions to activate this setting:

In Freehand, go to the File menu and select Other Options... giving you the menu in Figure 10-49. You can choose to Split Complex Paths there.

![Figure 10-49: Freehand File Menu Other Options...](image)
In Illustrator, choose Document Setup... under the File menu and activate Split Long Paths there. You will be given the warning in Figure 10-50.

**Figure 10-50: Illustrator Split Long Paths Warning**

**CASE 4 - Printing Comes Out Light or Streaked.**

It is probably time to replace the ink or toner cartridge. If you have an inkjet printer, you might try cleaning or prepping the print head to see if it is clogged or jammed. The location will vary from printer to printer, but look for settings and utilities similar to those shown in Figure 10-51. Likely locations are the Page Setup... options under the File menu or the Print window that comes up when you print a file.

**Figure 10-51: Printer Settings and Utilities Choices**
With a laser printer you might be able to squeeze a few extra pages out of the toner cartridge by removing the cartridge and gently rocking it from side to side. This redistributes the toner evenly and may clear up your output for a few pages. Check your printer's manual for any further tips or warnings.

If your toner cartridge is new, then there are still a couple of possibilities. First, you could simply have a bad cartridge. This is more likely if you are using recharged or refurbished toner cartridges. Second, your printer could require routine cleaning or maintenance. The LaserWriter 4/600 for example, includes a special brush and instructions for cleaning the printer. Check your manual for details.

**CASE 5 - Nothing Prints, But You See No Error Message.**

First, don't send the print job to the printer another dozen times to see whether it will print out. If there is no error message, your print job went somewhere. Check the following:

1. Look in the Chooser to see which printer you have selected. If you are on a network, you may be sending your output to a printer in another area or even another building.

2. If you are using a desktop printer, does its icon look like the one in Figure 10-52? This means the print queue is halted. If you double-click on the desktop printer icon, you will see something like Figure 10-53. There are all your print jobs. First delete the extras by selecting them and then clicking on the trash can icon. Next, select Start Print Queue from the Printing menu at the top of the screen. If you are using an older form of background printing such as the PrintMonitor application or a print server, you will need to do the same thing there. This may mean you need to contact your system administrator and own up to the fact that you just sent your document to the print server 87 times.
3. If you can't get control of the computer and find yourself staring at a Now Printing message of some sort, be patient. It may be that your print job is long and complex. Check to see whether your printer is flashing any sort of in-progress light to let you know it is busy.

4. Finally, you may be stuck in some sort of loop. Try holding down $\text{⌘} + \text{⌥}$ to stop the print job. As a last resort, restart the printer and computer.

**CASE 6 - Printing Causes a Crash, Bomb, or Other System Error.**

Crashes and bombs when you print can be the most exhausting, exasperating, and annoying problems to plague your Macintosh experience. They are rare, and if they occur something is probably broken or corrupted. Try all of the following in this order:

1. Shut everything down, wait a few seconds, and then power the printer up first, then the Mac. Double-check your printer selection in the Chooser and try printing again.
2. Turn off background printing and try again. This may indicate a corrupted background printing file. Be prepared to reinstall your printing software if the problem persists.

3. If nothing has worked yet, try repairing your hard drive. File corruption or damaged printer software could be causing the crash. Run Disk First Aid found on your Disk Tools diskette or System software CD-ROM. On the Mac OS 8 CD-ROM you will find it in the Utilities folder as shown in Figure 10-54. The best way to run Disk First Aid is to boot from the CD-ROM by restarting the machine with the CD in the drive. You will need to hold down the C key when you restart to force your Mac to boot from the CD-ROM. You can also insert the Mac OS 8 CD-ROM and set it as your startup disk. First, open the Startup Disk control panel found in the Control Panels folder under your Apple Menu. Select the CD-ROM as shown.
in Figure 10-55, close the control panel, and restart your machine. It should boot from the CD-ROM. Don’t forget to reset your Startup Disk control panel when you are done with Disk First Aid.

![Startup Disk](image)

*Figure 10-55: CD-ROM Selection in Startup Disk Control Panel Control Panels Folder*

After you have restarted, launch Disk First Aid and select your startup disk as shown in Figure 10-56. Click on the Repair button and let Disk First Aid do its thing. It will generate a report telling you of any errors it found or any files it had to repair. If you see your Chooser, Desktop Printer, System Software, or anything else related to the troublesome print job in the list of repaired files, consider reinstalling them.

4. Finally, reinstall everything remotely related to the problem. This last solution is a catch-all since it resets everything to its previous working status. Be reasonable with this step. If you can print from everything but Microsoft Word, just reinstall Word. If you can print to the StyleWriter, but output to the LaserWriter crashes everything, then just replace the LaserWriter software.
CASE 7 - You Get Some Form of Scratch Disk Is Full Error.

This annoying little message is quite common if you work with really big files with very little space on your hard drive. There are only two solutions:

1. Turn off background printing in the Chooser or from the appropriate menu for your printer driver such as the setting shown in Figure 10-57. This is the Background Printing set-
ting from the LaserWriter 8 Print window. The location of your setting may vary.

2. Make more room on your hard drive. When those files spool, they have to go somewhere.

**CASE 8 - Your Print Job Comes Out of the Wrong Printer.**

Oops! This is more embarrassment than error. The worst thing that can happen is you can waste a lot of expensive color output printing a draft copy of your work or a letter to grandma. The solution to this problem is simple:

Stop the print job! If you have sent a particularly long document to the wrong printer, immediately hold down the ~ + keys to cancel the print job. If it has spooled to the background, go to your desktop printer or the older PrintMonitor application and cancel printing. If PrintMonitor is running, you'll find it under the Finder Icon in the upper-right corner of your screen. With Desktop Printing, just double-click on the printer icon to open the print queue. Select the print job and click on the trash can icon. See the illustrations in Case 5 above for more information on canceling print jobs.

**Print Tools and Utilities**

For just about any print job you can imagine, there is a tool. We'll look at a few pieces of hardware and software that can make anything from QuickDraw to cross-platform printing easier.

**Specialized Printing Hardware**

**CoStar LabelWriters:** For about $160 you get a very fast label printer that captures information right off your screen. CoStar produces special labels for everything from Zip disks to envelopes.
**microPrint LocalTalk to Ethernet Hardware Bridge:** From Sonic Systems, the microPrint family of products starts at around $230 and provides you a way to connect LocalTalk devices to your Ethernet network. They even make a version that will service up to 12 devices and support TCP/IP Internet traffic. If you need to splice some older Macs or LocalTalk hardware onto your Ethernet, then this is your ticket.

**PC Talk MacLan Kit:** Miramar Systems can connect your Macs and PCs together for around $300. This price includes all of the connection hardware. In addition to sharing printers, you can share files between machines.

**PowerPrint:** Infowave’s PowerPrint software gives you the cable and drivers to support more than 1,400 PC printers. At around $100 it is an affordable way to ensure that you and your PowerBook will be able to print just about anything, anywhere, anytime. It also lets you dust off that old dot-matrix dinosaur you have in the closet and hook it to your Mac.

**Seiko Smart Label Printers:** Starting at around $130, these printers handle labels and only labels. They are useful if you can’t print labels in your laser printer.

**Software**

**Brimy PowerRIP:** If you ever need to turn your Canon, HP, or Epson printer into a PostScript Level 2 output device, you’ll want PowerRIP from Brimy. Prices vary based on the printer you have, but they start at around $90.

**FLIGHTCHECK:** FLIGHTCHECK from MarkzWare will scan your Photoshop, Illustrator, QuarkXPress, PageMaker, and Freehand files for more than 150 potential printing problems. It will also gather fonts and images you may need to print. All in all, it solves its $300 worth of headaches and then some.
**FlipBook:** For a printer toy, this is a good one. FlipBook from S. H. Pierce lets you create little movie books out of QuickTime movies. For around $35 you get the software needed to print a FlipBook, and for a few dollars more you can get special perforated paper to make assembling your FlipBook easier.

**Font Sneak:** Font Sneak from Deb Lake software strictly gathers fonts needed by your QuarkXPress, Illustrator, and EPS files for output. The free downloadable version on the Internet will handle up to five fonts.

**Port Share Pro:** From Stalker software lets you share one of your serial ports and the attached printer with other Macs on the network for around $150.

**PosterWorks:** S. H. Pierce's PosterWorks will print a poster as large as 10,000 square feet on your PostScript printer for around $400. It "tiles" your TIFF or EPS files to fit the size you specify.

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**Looking for this chapter's tools?**

**CoStar Label Writers:** www.costar.com (800-426-7827)
**FLIGHTCHECK:** www.markzware.com (800-300-3532)
**FlipBook:** www.posterworks.com (617-338-2222)
**Font Sneak:** members.aol.com/lakegroup/FSHome.html
**MicroPrint:** www.sonicsys.com (408-736-1900)
**PC Talk MacLan kit:** www.miramarsys.com (800-862-2526)
**Port Share Pro:** www.stalker.com (800-262-4722)
**PosterWorks:** www.posterworks.com (617-338-2222)
**PowerPrint:** www.infowave.net (800-663-6222)
**Seiko Smart Label Printers:** www.seikosmart.com (800-688-0817)
DON'T YOU WISH YOU COULD PREDICT EXACTLY WHAT YOU WILL need to do with your Mac throughout its lengthy lifetime and purchase a model that has everything in it you’ll need? Don’t you wish your computer life were more stable? We all do, but the fact is, computer life isn’t that simple. Remember that a 9-inch black-and-white screen used to be the Macintosh “standard.” Today, a Mac sporting two 17-inch color monitors on two video cards isn’t uncommon. As you expand your knowledge, as you increase the number and the complexity of tasks you expect your Mac to perform, and as the technology itself changes, you can expect to upgrade your computer.

We’ve discussed upgrading and customizing your Mac elsewhere in this book. In this chapter we want to offer you a short course in physically changing or expanding your Mac by changing or adding cards and memory. Some of you reading this book are probably saying, “I don’t touch anything inside the case.” That’s OK. It is a simple matter to carry your Mac down to the local computer store or service center to have a new card installed or to change your RAM configuration.

On the other hand, if you are even moderately adventurous, or if you have just a little bit of hardware experience—not necessarily with computers—then making standard changes and additions to the hardware inside your Mac shouldn’t be that hard for you. And knowing how to make these simple additions gives you a great deal of independence and self-confidence to make your computer what you need and want it to
be. Apple has generally made this easy for you by making the cases easier and easier to access.

Keep in mind, however, that virtually every Mac model requires a slightly different procedure for expanding memory or adding cards. On the other hand, if you're just getting started with this level of Mac maintenance, the general guidelines we provide in this chapter, coupled with more-detailed information from the user manual that came with your Mac, will help make the job a lot easier. Study the concepts and guidelines here for general understanding, then use your user manual and what you discover when you actually get inside the case for specific information.

Cards

We have mentioned the concept of hardware cards inside your Mac in other sections of this book, but what are they, really? The concept of expansion cards for computers is as old as computers. In the earliest machines, what we call a card today was an entire module, perhaps as big as a steamer trunk. Today a card is simply a relatively small rectangular circuit board—the material your Mac motherboard is made of—with connectors along the bottom. We use these expansion cards to permit changes to the hardware configuration of a computer without the necessity of throwing away the whole thing. The majority of the computing power built into your Mac is contained in electronic components on the motherboard.

What kind of cards can you find? Just name it! There are video cards, 3D accelerators, TV cards to receive TV signals, and TV cards to digitize video. You can get cheap video cards and expensive video cards. You can even get a Pentium PC on a card if you want. Generally, adding a card for a second monitor is very cheap and easy and one of the best upgrades you can make if you can afford it. The versatility it gives you is amazing. You can place tools...
and controls on one screen and your work on another. When you are online, you can have a screen for your browser and one for email. Adding a PC on a card can give you the fastest, most stable way to run any flavor of Windows under your Mac's hood. Be sure to pay more attention to the cards offered in your Mac catalogs and magazines. There is something for everyone.

Memory

Who says you can have too much of a good thing? We say no Mac can ever have enough memory. We practically guarantee that no matter how much memory your Mac has now, you'd like it better with more. Sure, it may be working fine now, but wait until you add that mega-graphics application or a Windows 95 emulator. You'll want more memory.

Depending on the Mac model you have, there may or may not be some RAM soldered to the motherboard inside the computer. If there is, this is probably minimal memory—4 to 8 megabytes—and it is memory you can't remove. Unless you have expanded your memory previously, then the additional memory expansion slots for memory will be empty.

If you have no memory soldered to the motherboard, then whatever RAM you have is installed in expansion slots mounted on the motherboard. How these slots are configured depends on your machine—its age and its design.

Aside from the memory that may be soldered to the motherboard, all Mac memory is mounted in sockets on the motherboard. These sockets have 30 pins, 72 pins, or 168 pins. There may be another memory socket for your PowerPC's secondary (level 2) cache also on the motherboard. This socket will have 160 pins.

The memory that goes into these sockets is mounted on a thin strip of double-sided circuit board. In the top two-thirds or so of the board are the memory chips themselves. At the bottom of the board is a row
of connector pins that plug into the expansion slot on the motherboard. These pins provide the communications connections between the memory module and the components on the motherboard and carry voltage necessary to operate the memory chips.

The memory boards are called SIMMs, for single inline memory module, or DIMMs, for dual inline memory module. Older Macs use SIMMs that plug into 30- or 72-pin expansion slots. Each 30-pin SIMM supports an 8-bit data path. The 72-pin SIMMs are 32-bit devices. Newer Power Macs use 168-pin DIMMs. These DIMMs are like two SIMMs merged together on the same expansion board and are designed to support the newer 64-bit CPUs and data buses.

So if your computer has a 32-bit CPU and 30-pin SIMMs, you would need four SIMMs to support the 32-bit data path. Memory is additionally divided into banks to help with access speed and data management. These memory banks usually are identified as Bank 0 and Bank 1. Memory is installed in banks with matching boards in the same positions in Bank 0 and Bank 1. You can’t plug in a SIMM in just one bank. You need at least two SIMMs so that both banks are filled in corresponding slots. If your machine uses 72-pin SIMMs, you can get by with only two of them, one for each bank.

If yours is a newer Mac with 168-pin DIMMs, you need only one, since both banks are installed on a single circuit board. One reason designers moved up to DIMMs is the requirement for more RAM in today’s faster computers. The two-board requirement of the SIMM boards was taking up too much motherboard space.

The number of expansion boards required for RAM doesn’t necessarily specify how much memory is available. You need 8 bits of storage for each byte—character—of memory. Some memory boards come with eight chips—one chip for each bit in the stored byte. The capacity of each chip varies so that you may have 8, 16, 32, or 64 Mbytes of total memory on a given expansion board.
As you replace or expand RAM in your Mac, you must match the new or replacement RAM to your system requirements. That includes the circuit board type (SIMM or DIMM), which we have already discussed, memory technology, and speed.

And RAM technology is evolving. Some memory designs use EDO chips, for example. EDO stands for Extended Data Out, which describes how the chips manage information flow in and out. EDO chips are potentially faster than conventional RAM because it buffers data requests while servicing previous requests. You may successfully mix EDO with conventional RAM, but only at the bank level. You can't have mixed RAM types within the same memory bank.

Memory also is rated according to its speed. Older Macs use 80 ns (nanosecond) RAM. Newer Macs require faster RAM capable of 70- or 60-nanosecond operation. As you expand your Mac you'll need to make sure that you use the proper memory. Check your machine's user manual to determine what memory you need. Also, mainstream mail-order and high-quality local computer stores know what your machine needs. If you supply the vendor with the model of your machine he'll be able to supply the proper expansion memory.
The design feature that lets you expand the Mac's hardware with expansion cards is an architecture that includes an internal bus. The various electronic chips and larger components inside your Mac have to be connected to one another so they can share data or "talk." If the connections among internal components were made with individual wires, then only those components that were wired together could communicate. The bus establishes a common set of wires (called lands on the circuit board) with a series of connectors that attach to each of these wires. A simplified drawing of a computer bus is shown in Figure 11-1.

This design lets devices that are not part of the main motherboard communicate with components on the motherboard. As you can see in Figure 11-1, the multiple connectors on the motherboard share common wiring. Connector number 1 on expansion slot 1 is connected to connector number 1 on all of the other expansion slots that are part of the motherboard. Anything you plug into a bus slot can talk to other cards plugged into other bus slots and to anything on the motherboard that has access to the bus.

Figure 11-2 shows a typical bus expansion card for the PCI bus. You can see metal fingers at the bottom of the card that provide the actual connection to the bus. These metal fingers insert into the connector on
the motherboard, which in turn connects to the common wires that make up the bus. As soon as you insert a card into the bus and turn on the power, the new card has access to the common signals and information inside the computer, and the computer (as well as any other adapter cards) can access the new card.

In theory each expansion slot provides equally reliable connections to the bus. In practice, however, you may be told to plug some adapter cards into certain slots. An instruction like this reflects the fact that signal levels vary with the distance from the CPU and the amount of signal echo and interference also can be a factor in various card slots.

What does the bus do? It is strictly a transport mechanism. Although we said in the previous paragraph that you may be instructed to use one slot over another, in theory all slots are the same and merely carry signals to other slots and to devices on the motherboard. The industry standard definition for the buses the Mac supports doesn't include a specified function for any particular slot. So you don't have a slot for disk drives, and a slot for modems, and so on. The bus definition is broader than that.
Bus Standards

In the history of desktop computing there have been many bus designs and standards. Presently only two bus standards need concern Macintosh users: NuBus and PCI. And, as a practical matter, only the PCI bus remains, since NuBus is not used on new Macs. Of course a lot of older Macs are around and there are a lot of NuBus expansion cards available for them.

NuBus

The NuBus communications standard is relatively simple compared to PCI and other newer and denser designs. (See the discussion of the PCI bus in the next section of this chapter.) NuBus cards are of two types, master and slave. The slave depends on the master card and/or the CPU for instructions and operation. The master card, on the other hand, can operate independently. NuBus cards support up to 32-bit addressing, but some Macintosh computers are set for 24-bit NuBus design. The NuBus specification supports up to 16 expansion cards on a single bus, but Apple’s design limits the number to only six cards. NuBus cards can support data transfer from 7 Mbytes per second to around 32 Mbytes per second or a little faster, depending on the computer and card design.

Upgraded Macs create a NuBus bonanza! If you have an older Mac with NuBus slots, then you should haunt some of the Usenet newsgroups such as misc.forsale.computers.mac-specific.cards.video and misc.forsale.computers.mac-specific.misc. Local and regional computer swap meets also are great resources for some of this older hardware, as are newsletters, bargain shopper newspapers, and used buyer guides. Lots of people are upgrading to faster PowerPC Macs all the time and as they do, a flood of older NuBus cards hits the market. If you ever wanted to buy the digital video capture card or extra video card to drive two monitors, now is the time. Since there is no new market for NuBus card, expect their prices to plummet for years to come on the used market. After that, they’ll begin to become rarer and prices may rise slightly. No matter what happens, the selection of NuBus Hardware is not likely to be as good as it is right now.
The NuBus is the expansion bus for older Macs. Even older Power Macs use NuBus, but Power Macs manufactured during 1997 and later mostly use the newer and faster PCI bus. Some newer PCI machines can support NuBus expansion boards through a special bridge to connect the two buses. In general, however, PCI is the bus standard for Power Macs.

**PCI Bus**

As CPU speeds increased and the user's need for quick display screen updates grew, hardware designers began to develop a concept called the local bus. Conventional computer buses are relatively slow compared to processor speed, and they may require that data destined for a display adapter, say, would have to move into RAM first. The local bus concept broadens the data path, reduces the length and complexity of the path, and raises communication speed among internal components.

The PCI standard is one such local bus. The PCI standard is designed and maintained by the Peripheral Component Interconnect Special Interest Group (PCI SIG), an unincorporated association of microcomputer industry representatives (2575 NE Kathryn St #17, Hillsboro, OR 97124, FAX: 503-693-8344, www.pcisig.com). The organization is made up of 12 members, 11 of whom are voting members. Apple is a voting member of the organization. PCI was originally designed for Intel-based computers, but Apple and other manufacturers are adopting it because of the strength of the industry standard it represents. All of Apple's newest PowerPC Macs use the PCI local bus. As long as there is software to support the PCI card design you can theoretically plug any PCI-compliant card into any computer with a PCI bus. As a practical matter every manufacturer of PCI expansion cards won't support Apple, PC-compatible, and other markets, but many will. This significantly strengthens the Macintosh line and broadens peripheral device support for it. Expansion cards such as Ethernet controllers, hard disk controllers, IEEE 1394 I/O cards, mostly don't care whether they're plugged into a Mac or a PC. The PCI bus itself is virtually the same from platform to platform. Of course you need the proper drivers
CHAPTER 11: CHANGING CARDS AND RAM

or other software running on your Mac to support these hardware additions.

The PCI standard also provides better performance. A PCI card can work up to three times faster than a similar NuBus card, for example. Table 11-1 shows a comparison among key features between PCI and NuBus cards.

<table>
<thead>
<tr>
<th></th>
<th>PCI</th>
<th>NuBus Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>33 MHz</td>
<td>10 MHz</td>
</tr>
<tr>
<td>Theoretical Max.</td>
<td>132MBytes per second</td>
<td>40MBytes per second</td>
</tr>
<tr>
<td>Throughput</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Number of Slots</td>
<td>4 per bridge-256 bridges</td>
<td>6 per bridge-14 total slots</td>
</tr>
<tr>
<td>Real Throughput</td>
<td>90Mbyte-per-second writes</td>
<td>45Mbyte-per-second reads</td>
</tr>
<tr>
<td></td>
<td>32Mbyte-per-second writes</td>
<td>20Mbyte-per-second reads</td>
</tr>
<tr>
<td>Software</td>
<td>Name Registry, Open Firmware</td>
<td>Slot Manager</td>
</tr>
<tr>
<td>Form Factor</td>
<td>12.283 inches and 6.875 inches</td>
<td>12 inches and 7 inches</td>
</tr>
</tbody>
</table>

Table 11-1: PCI-NuBus Comparison (Courtesy of Apple Computer)

A PCI local bus can be 32- or 64-bits wide and supports 5- and 3.3-volt designs. These are the voltages used to carry signals across the bus. The lower voltages are primarily designed for desktop or portable computer designs, but we're seeing low-voltage desktop machines as well. PCI is a viable bus for desktop designs as well as the low-power portable or laptop market. The PCI bus is among the first long-duration interface standards that are designed to grow with evolving hardware design and that can function cross-platform. You'll find the PCI local bus in most newer, PC-compatible machines as well as on the Macintosh.

The PCI bus was originally designed to speed up graphics display, since it improved information transfer to and from the CPU and display memory. Over time, however, designers have moved disk controllers, network interface cards, high-speed, high-resolution printers, cameras, and other devices to the PCI bus as well. Figure 11-3 shows a conceptual diagram of the PCI bus.
Figure 11-3: PCI Bus

PCI standard V. 2.1 specifies six types of PCI slots:

32-Bit 3 Volt PCI Slot
32-Bit 5 Volt PCI Slot
32-Bit Universal PCI Slot (3.3-and 5-volts)

64-Bit 3 Volt PCI Slot
64-Bit 5 Volt PCI Slot
64-Bit Universal PCI Slot (3.3-and 5-volts)

The 32-bit cards can transfer data at up to 132 Mbytes per second; the 64-bit cards handle transfers up to 264Mbytes per second. To get an idea of what this means, remember that standard Ethernet transfers data at 10 Mbps (about one MByte per second) and fiber-based Ethernet (FDDI) supports speeds of 100- to 200-Mbps (about 10-20Mbytes per second). Most PCI computers use 32-bit slots, but with new CPU designs there is a rising number of 64-bit cards.

Another part of the specification calls for PCI cards to be autoconfigurable. This is accomplished by storing information about the peripheral right on the PCI card itself and including in the OS routines that can read this information and use it to help merge the new card into the overall system design. And there are two general classes of PCI device: a target and a master. A target card accepts commands from and responds to requests by the master. A master card is capable of doing...
its work independently of the bus or other devices in the system. A master device also can function as a target for other masters.

**Adding Cards**

Although the physical technology of NuBus and PCI expansion cards is different, the process for adding a new card to your Mac is essentially the same regardless of the bus it uses. This is a process you’ll need to try to understand, but once you see the picture you should become quite comfortable removing and installing new expansion cards in your Mac.

First the basics. Before you add, remove, or move any hardware inside your Mac, turn off the computer and unplug it! Unplug it all the way by removing the AC plug in the wall, the printer cable, and any other connections to outside devices. This will ensure that you don’t break a connector, stretch a cable, or pull another piece of equipment off the desk, but it also ensures that there are no unknown voltages floating around inside the box. After you’ve unplugged everything, wait a few minutes before you put your hands inside the case. Today’s power supplies are well filtered, which means the relatively large capacitors associated with the filter circuit can hold voltage for a while. Different supplies will bleed off voltage at different rates, depending on the design. Just be on the safe side.

If you regularly work on hardware, you might want to establish a static-free workplace to help you out. Professional workbenches sometimes have conductive pads on top of a wooden bench, for example. This pad is connected to a solid earth ground, either through the house or office wiring, via a cold water pipe or radiator, or through a dedicated electronic ground. In newer buildings the little screw that holds the faceplate on AC outlets are almost certainly grounded. You can touch one of those before you start working on your Mac to ensure that your body isn’t holding a static charge. In two of our offices we run a wire from this electrical ground to a small clip on the workbench, which we can clip onto the chassis of whatever we are working on.
Next you'll have to remove the cover on your computer. This process varies with the case design. Three basic designs are common: full-sized desktop cases, compact desktop cases, and laptop cases. The concept for uncovering the internal working parts of your computer is the same for all three designs, but the specifics vary slightly.

**Removing the Desktop Case**

Even among desktop cases you may find some variation in the precise process of removing the cover. On a Mac you almost never have to fiddle with screws. If you do, it is generally just one or two to keep things in place. Once loose, the sturdy cover should slide free. Just be careful not to pull or crimp any of the wiring or cables inside the case as you raise the cover. Set the cover aside, out of the way of where you will be working on the inside of your computer.

**Removing the Compact Desktop Case**

Compact desktop cases come in various forms as well. Since the late '80s these cases haven't used screws at all. Rather, you lift a plastic tab that releases the case so you can lift it away from the chassis. The biggest problem with these cases is their tight fit. It may appear at first that you don't have it released and you may feel it will never lift up and away. Check the release tab again, then go for it. As with the full-sized cover, the compact cover can be damaged if you step on it (or fall over it), so set it well out of the way to give yourself room to work.

**Removing the Laptop Case**

Generally, you don't remove the case on a PowerBook for upgrades. On some models you release a pair of screws and get access to the RAM slots under the keyboard. On others, you will have to remove the case. Either way, you are probably better off taking your PowerBook in for the upgrade. There is just more to fiddling around inside a PowerBook case than there is on a desktop machine.
Locating the Slots

Much of what makes your Mac run is firmly soldered to the motherboard. You should easily see two or three kinds of expansion slot on the motherboard, however. One expansion bus is the RAM bus and the other is the NuBus (older machines) or the PCI bus (PowerPC machines). If yours is a PowerPC machine, you may see a third slot type, the external (level 2) CPU cache. Later PowerPCs have memory installed in this slot when you buy it. Earlier models may have a blank cache expansion slot. You should really have no problem identifying the two.

Most designs separate memory from the expansion bus. Look for the memory sockets first. The memory slots on your older Mac contain 72 pins designed to accept the connector fingers from the bottom of the memory card. Recent PowerPC computers have 168-pin memory expansion slots. You can then identify the PCI or NuBus slots. These are larger than the memory expansion socket, and the PCI slot, particularly, is more dense.

Inserting RAM

Whether you are installing DIMM or SIMM memory, the process of physically inserting the memory board is basically the same. You should make sure you have purchased the proper expansion module before you actually install any memory. (See the section on memory types and memory expansion tips earlier in this chapter.)

Your new memory was delivered inside a conductive plastic bag or other conductive enclosure. This is done to reduce the chances of any damage to the module from static discharges. Keep the memory board inside this protective cover until you are ready to install it. Although today's memory chips are pretty rugged, they can be damaged by a large enough difference of potential, the kind of voltage buildup that can happen when you walk across a carpet or even vinyl floor on a cool, dry day.
Don't believe that just because you don't see sparks flying from your fingers when you touch sensitive electronic memory components that there is no danger of damage. It doesn't take sparks and flashes to cause damage, so follow our suggestions for handling the memory chips. Here are the basic steps in the process:

1) Position the new memory modules inside their protective packaging close to the computer. You should have removed the case and situated the cover out of the way at this point.

2) Touch the power supply, not one of the circuit boards inside the chassis, with one hand. The best place to touch is the flat metal plate located somewhere along the back side of your Mac's case that is the power-supply cover. This will discharge any static buildup you may have collected. Remember that static charges build up because of a difference of grounding potential between two objects. One of those objects can be your body. You don't need a firm earth ground to discharge static, just something that is at a different charge (polarity) state. Don't think that just because your Mac isn't plugged into a grounded outlet there's no danger of static buildup.

3) Without removing your hand from the computer chassis, pick up the memory package with the other. Now the memory module, inside its conductive case, should be at the same potential as your body.

4) Let go of the computer case and remove the memory module from its package.

5) Locate the proper memory slot or slots. Chances are there already are memory modules installed in two or more of the slots. That'll help you locate the proper area of the motherboard. Note the orientation of any existing SIMMs or DIMMs.

6) Again, touch the power supply with one hand, holding the memory module in the other. Now it is safe to move the memory module into the computer case.
7) Keeping one hand on the power-supply case, use the other hand to orient the module over the intended expansion slot, taking care to position the module in the same way as the existing modules. The SIMM or DIMM should insert into the memory slot only one way. Notice that one end of the board has a small notch or indent on the bottom side, the side with the connector pins (see Figure 11-4). This will help you orient the board into the socket. The motherboard may have an icon to indicate the orientation of this notch, but if you study the socket itself you can see how it accommodates the notch on one end and not on the other. Notice, too, the small clips or retainers at each end of the socket. These will snap into place when you insert the memory expansion module. Once you have loosely dropped the memory module into its socket, it is safe to remove your hand from the power supply and use both hands to finish the installation.

8) Loosely insert the memory module into the appropriate memory socket. When the installation process is complete this circuit board will sit perpendicular to the motherboard and the socket that holds it. However, to insert it properly you will lean the expansion module 30 to 45 degrees (see Figure 11-5). You don't really have to force the module down into the socket in the same way you do a PCI or NuBus expansion
card. Just position it inside the socket, leaning slightly to one side. If you are installing DIMMs the process is slightly different. DIMMs install more vertically and don't have the distinctive snap-into-place feel of a SIMM module.

9) While exerting a little pressure on the top of the module with one hand, ease it into a vertical position. The retainer clips should snap in and the module should seat itself into the socket in a vertical position.

10) As a final check, wiggle the board side-to-side to make sure it is firmly inserted in the socket. Also visually check its position. All pins should be embedded in the socket equally and the card should be level on the top.

When you restart your Mac, all should go well. Look at About this Computer under the Apple menu for a look at your new RAM. If anything is wrong, your Mac probably won't start at all and you will get the dreaded Sad Mac shown in Figure 11-6. Don't panic, just open the case and make sure the new memory modules are firmly in place. This error message is usually a sign that you haven't quite installed them.
Inserting Expansion Cards

NuBus and PCI expansion cards are slightly different in appearance and design, but they insert into their respective expansion slots in the same way. Refer to the previous section on installing RAM for some hints on avoiding static-discharge damage.

Here are the basic steps for inserting a NuBus or PCI expansion card into your Mac.

1) Position the new card inside its protective packaging close to the computer. You should have removed the case and situated the cover out of the way at this point.

2) Touch the computer case—the case or chassis, not one of the circuit boards inside the chassis—with one hand. The power-supply cover is the best place to touch, since most Macs are built with a composite chassis. This will discharge any static charge you may have collected.

3) Without removing your hand from the computer chassis or power supply, pick up the expansion-card package with the other. Now the expansion card, inside its conductive case, should be at the same potential as your body.

4) Let go of the computer case and remove the card from its package.

5) Locate the proper expansion slot. Chances are there already are NuBus or PCI cards installed in one or more of the slots. That'll help you locate the proper area of the motherboard. Note the orientation of any existing expansion cards.

6) Again, touch the computer case or chassis with one hand, holding the expansion card in the other. Now it is safe to move the card into the computer case.

7) Orient the card over the intended expansion slot, taking care to position it in the same way as the existing cards. The card will insert into
the bus slot only one way. Notice that the end of the board closest to the outside of the case, the end with the metal bracket, has a small notch or indent on the bottom side, the side with the connector pins. At the other end of the card is a gap in the pins (see Figure 11-7). The forward notch and the rear gap will help you orient the board into the socket.

8) Loosely insert the card into the appropriate socket. Make sure you have positioned the rear notch over the spacer in the socket and take care to line up all pins. It is fairly easy to slip one end of the card so that the pins don't fall into the socket on that end.

9) When the board is positioned in the socket, press firmly on one end to push the board's pins further into the socket (see Figure 11-8). Next, press the other end of the board to push the pins on that end of the board into the socket. You may have to repeat this process a couple of times to rock the board into place. It can actually take a fair amount of pressure to seat the board. Don't be afraid to exert the force needed, but do make sure the pins are aligned before you press the board down.
10) As a final check, wiggle the board side-to-side to make sure it is firmly inserted in the socket. Also visually check its position. All pins should be embedded in the socket equally, and the card should be level on the top.

Figure 11-8: Firmly Press on Left Side

Like with memory modules above, expansion cards must be fully inserted and all pins connected before anything on your Mac will function. Your Mac will balk at starting up with an improperly installed NuBus or PCI card. If you see the Sad Mac lurking around, then you’ll want to double-check your installation. You might even try installing the cards in a different available slot. Sometimes they won’t quite be all the way in and a simple rocking motion will seat them. As always, be gentle with them.

No matter which you install, cards or RAM, you should be up and running in no time. Since standards on the Macintosh platform are so tightly controlled, you are less likely to find that your computer doesn’t recognize the hardware. Your added RAM will provide you a great speed boost, and you will have fresh new computing abilities with your installed card. Start up and enjoy.
If something doesn't work properly and you can't see anything wrong with a visual inspection, then fall back to standard troubleshooting practices. If your Mac won't boot after you have installed new RAM or an expansion bus card, for example, the first thing to do is remove whatever you added and see if the computer works properly then. If not, your problems go deeper than the device you just installed. If it works after you remove new hardware, then something is wrong, obviously, with the configuration of the new device or with the way you installed it. Start over and see if you correct the problem this time.

One of the best general troubleshooting tips we can offer is a question you should ask yourself whenever you have problems with Mac hardware or software: "What has changed (or what have I done) since everything was working properly?" If you can answer that question carefully, you should be able to work backwards toward a solution.

Refer also to Chapter 6—Troubleshooting for additional help if correcting a Mac problem, even one you caused by trying to install something new.
UNTIL NOW, WE'VE IGNORED THAT HARD DRIVE INSIDE YOUR computer for the most part. We have just assumed it worked. Many people never need to know any more than how to use it in the same way many drivers never know how their engine works. If you want to expand the amount of drive space you have, then you'll need to know more about your hard drive and your SCSI chain. SCSI stands for small computer system interface and it is more than just a way to add hard drives to your computer. You can add up to seven different devices in a standard string or chain and 15 devices or more in newer, high-performance SCSI chains. Usually, some of these are already taken by your Mac's CD-ROM and hard drive. But the SCSI interface isn't limited to just hard drives. Scanners and printers—anything that benefits from fairly high speed data input/output with your computer—theoretically could be designed with a SCSI interface.

It wasn't always so on the Macintosh and it isn't universally that way today. The original Mac had a single floppy drive that held only 400K or so. When hard drives came along, Apple adopted SCSI as the standard for the hard drive on the Macintosh. Recently, as Apple launched the new Mac clones and fought to lower costs, the company started using the less versatile and cheaper IDE standard. Regardless of the drive in your Macintosh, there will be some similar skills and terminology to learn.
Types of Drives and Devices

As we’ve mentioned elsewhere, the Mac platform may have SCSI drives and IDE drives. IDE stands for integrated drive electronics, and it has been a standard in the DOS (PC-compatible) world for years. IDE incorporates most of the electronics—the interface intelligence in the hard drive itself, which means the interface is much simpler and costs less than if the controller had to do most of the input/output work.

Additionally, CD-ROM drives, Zip drives, scanners, and other devices that can take advantage of your SCSI port may be installed on your Mac. It is the most versatile connection on your Mac, right up there with the ADB port, which is SCSI-like in its design.

IDE and SCSI

The Macintosh standard for disk and other input/output was and still is SCSI, which comes in three flavors. In the beginning there was SCSI-1, and that remains a baseline standard to this day. All Macs have standard SCSI connectors, even if your Mac has a newer, high-performance SCSI interface. The standard SCSI interface is capable of moving data at about 5 Megabytes per second at peak efficiency, but the speed at which the drive spins also determines data-transfer speed. Typically, IDE drives run at 4,500 rpm and standard SCSI drives at 5,400 rpm. Some newer Macs sport SCSI-2 interfaces and connectors. SCSI-2 drives usually run at 7,200 rpm or faster. SCSI-2 is faster than standard SCSI-1 and comes in three flavors, fast, wide, and fast & wide. Each of these versions has different design characteristics and each represents a slightly different way to speed up hard-disk throughput. Many Macs with the SCSI-2 interface use this faster SCSI for their internal drives and also include a standard SCSI port for external devices.

One way to improve disk-drive throughput is simply to make it shovr more bits through the SCSI cable. This method, a lot like increasing the
pressure on a fire hose, is called Fast SCSI-2. Another option is to move more data at a time, a little like using a bigger fire hose without increasing the pressure. That's Wide SCSI-2, which uses a 16-bit-wide data path instead of the 8-bit path of standard SCSI. With a data path twice as wide you can move twice as much data, but at the same speed. These two technologies in isolation can increase your SCSI performance to 10 Megabytes per second. They can be combined to form a Fast & Wide SCSI-2 drive that will move an awesome 20 Megabytes per second. To add this ability, you need a SCSI-2 card for your Mac and a free NuBus or PCI slot.

You can also get a SCSI-3 card—sometimes called ultrawide SCSI—for your Mac. Some SCSI-3 drives run at 10,000 rpm. It is faster than SCSI-2 and it costs more, of course. For the extra money, you get a serious performance boost. A SCSI-3 drive can move 40 Megabytes per second. Digital video and animation are driving marketplace demand for these high-speed drives. When you work with large files or broadcast quality animation, you simply need to shove as many bits as possible from disk to disk or disk to screen. In addition, some manufacturers are offering a dual ultrawide SCSI interface, which is really two SCSI interfaces on a single card. With the proper peripherals—drives and other devices that can handle it and software to manage it—you can move data across your dual SCSI bus at 80 MBytes per second.

The other drive you may find on some Macs is the IDE drive. Its big disadvantage is the IDE interface's relatively limited functionality. You are limited to two drives inside the case. You can't use it for high-speed AV drives or to connect the range of devices you can with SCSI. On the other hand, all IDE Macs such as the 6300 series, PowerBook Duo 2300, and PowerBook 5300 also have full SCSI ports for handling these deficiencies. On the plus side, IDE drives are cheaper than SCSI drives. They are almost as fast as standard SCSI drives and don't have as many rules or conflicts to worry about when you add a second one. Macs with IDE drives are few and are generally the cheaper machines in the Macintosh family. If you have enough room in the case, you can add a second IDE slave drive to your Mac. And, as with SCSI, technical devel-
Development in IDE hasn't stopped. The latest standard, EIDE (enhanced integrated drive electronics), offers data transfer rates up to 16.6 Megabytes per second and will host drives as large as 137 Gbytes. In addition, an EIDE bus will support up to four drives instead of just two as was the case with original IDE. CD-ROM and backup tape drives with EIDE interfaces also are available. Interestingly, you can install a new EIDE peripheral on an older IDE bus but, of course, the EIDE device will perform only at the IDE level. And some EIDE controllers are dual-port designs that combine a standard IDE port and connector with the enhanced EIDE port. This design lets you combine older and relatively slow IDE peripherals with newer, high-performance EIDE equipment efficiently.

Removables

When you get to the last few megabytes of free space on any hard drive, you generally start looking at removable drives. These drives write their information to a cartridge that can be removed and replaced with a completely different cartridge on the fly. This category also includes any device that creates a CD. In either case, the removable disks or cartridges are typically called media. You must get the right kind of media for your drive in much the same way you must have the right videotape for your VCR or camera.

What you do with the storage is up to you. You can keep one disk for documents, another for carrying files to work, and another for storing games. You will often find them at service bureaus where you take work to be printed. The most popular removable drive on the Macintosh is the Iomega Zip drive, but there are dozens of other drives and formats. You can get Magneto Optical drives, CD Burners, and a variety of removable drives from other companies such as Syquest.

Iomega produces two important products. First, the Zip disk shown in Figure 12-1 is becoming a standard in the Mac and the PC worlds. This drive offers convenient, 100-megabyte storage on 3.5-inch cartridges not much bigger than a standard floppy disk and at a reasonable
Figure 12-1: Iomega Zip Disk By Sony

price. The drive costs only about $100 or a little more as a Mac add-on, and you will find it installed on many Macs. Disks vary in price, but they're generally about $10 each in quantity. Jaz drives are Iomega’s removable storage solution for anyone dealing with really large files. The drive itself costs $300 or so and 1-gigabyte cartridges for the Jaz drive cost less than $100 in quantity. Additionally, Jaz disks are faster than Zip disks by a long shot. In many cases they are as fast or faster than your installed IDE or SCSI hard drive.

Syquest has been a removable storage manufacturer on the Macintosh platform for years. You may still see their older drives in the 44-megabyte, 88-megabyte, 200-megabyte, and 270-megabyte storage sizes at service bureaus or in the used-hardware newsgroups on Usenet. They made other varieties as well, but these were the most popular sizes on the Mac platform. Syquest also produces the EZFlyer and SyJet drives. Priced very close to Iomega's Jaz and Zip drives, the EZFlyer offers 230 megs of storage; the Syjet offers 1.5 gigabytes.

You may also want to consider a CD recorder. First, regular CD-ROM burners are getting cheaper, some for $500 or less. Second, CD media is cheap. You can get a 650-Megabyte recordable disk for just a few dol-
lars. Finally, since you can't overwrite a CD-ROM, they make a great option for long-term archival storage.

**SCSI Devices**

Of course, drives are just the beginning of your SCSI chain. You can also attach scanners, CD-ROMs, tape drives, and other devices. You can even attach another Mac! All of the basic SCSI rules we discuss in the SCSI Voodoo section apply.

*CD-ROM* drives are standard on the Mac platform today. Every Mac you buy probably will come with one. You can also buy external CD-ROMs and CD jukeboxes. The jukeboxes let you mount multiple CDs on a single machine or server. This is a handy way to make several CDs available over a network or place your stock art and font CDs close at hand.

*DVD-ROM* drives are another rising standard. Many machines are starting to ship with them now. DVDs can hold many times more data than a standard CD. Where you can put around 650 megabytes of data on a CD-ROM, you can store 18 gigabytes of data on a DVD-ROM disk. The drives are also backward compatible and will read older CD-ROMs. In addition to viewing data, these disks can be used to store movies, sound, and more. Look for more developments in this emerging market.

A final drive you can attach to your Mac is another Mac! Several models of Mac PowerBook can be connected to your full-sized desktop computer and used as a SCSI device. When connecting a PowerBook, you will need a special adapter like the one shown in Figure 12-2. This is called an *HDI-30 SCSI Disk Adapter* and can be found in most catalogs or at your local Mac retailer.
SCSI docking your PowerBook is an incredibly handy way to link your portable and desktop systems. Just make sure you don't start up both of them in SCSI mode! When your Mac and PowerBook startup on the same SCSI chain, strange and dangerous things can happen. You can cause damage to one or both computer's SCSI controllers and drive damage can result as well. Make very sure you are in dock mode before you power up.

Not all Mac PowerBooks support this feature. Some models including the PowerBook 140 and 170 were designed earlier than this advance or with economy in mind. Be sure to check your PowerBook's manuals and see whether it supports this before trying it. After you're sure, you'll find the whole procedure is very easy.

First, you simply set a SCSI ID for your PowerBook in the PowerBook Setup control panel. This control panel varies slightly depending on the system software version, but it will look something like Figure 12-3. Select a SCSI ID by clicking one of the radio buttons.

![Figure 12-3: PowerBook Setup Control](image)
Next, close the control panel and shut down the PowerBook and the other Mac. Plug that adapter we discussed into your PowerBook and attach a SCSI cable to it. Make sure the switch is set to DOCK and not SCSI. Connect the other end of the SCSI cable directly to your other Mac or the end of your SCSI chain. Your PowerBook is self-terminating and must be at the end of your SCSI chain.

Now restart the PowerBook and wait for the surprise. Instead of a normal startup, you get a large bouncing SCSI icon with the PowerBook's SCSI ID in it. This strange-looking icon will be displayed as long as the PowerBook is in dock mode. Now start the other Mac. You should see the PowerBook on the desktop as if it were an attached hard drive. Feel free to copy files, share documents, and generally treat this drive like any other. You probably don’t want to fiddle with the PowerBook’s System Folder, but everything else is fair game.

**Raids**

Sometimes your drive just isn’t fast enough or dependable enough. There is one great drive trick for extending the abilities of your hard drive, called RAID. RAID stands for Redundant Array of Independent Disks. The idea behind RAID is to use two or more hard disks to achieve redundant, reliable storage with reasonably high-transfer speed. A potential bonus is that the individual drives in a RAID array (array because there are multiple drives) need not be at the extreme high end, since you have the protection of redundant storage.

Imagine a storage device with two hard drives and a special controller that can distribute information across the two drives in special ways that make it appear there is only one drive. The controller and the software that supports it can be configured in a number of ways. With more drives and different configurations you can virtually ensure data integrity and achieve good performance, even with inexpensive hardware.
The RAID specification provides for five levels, each with a different level of fault tolerance. Different RAID levels also are designed to achieve different results. You can configure a RAID array for maximum speed or for maximum fault tolerance.

Table 12-1 provides a brief summary of the various RAID levels.

Table 12-1: RAID Levels

<table>
<thead>
<tr>
<th>RAID Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Called data striping, this level divides stored data over multiple disk drives in a way that enhances data-transfer speed, but it offers no fault tolerance.</td>
</tr>
<tr>
<td>1</td>
<td>Disk mirroring (volume shadowing). Each drive in the array records the same information for fault tolerance.</td>
</tr>
<tr>
<td>0+1</td>
<td>A combination of levels 0 and stripes data across two or more mirrored drives.</td>
</tr>
<tr>
<td>2</td>
<td>Bit interleaving/multiple disk checks. Not a commercial specification.</td>
</tr>
<tr>
<td>3</td>
<td>Data striping with parity. Bit interleaving with two disks. At level 3 RAID data is distributed among several drives, maintaining good performance. In addition, parity information is stored on a separate drive. In the event of data loss this parity information can be used to restore it.</td>
</tr>
<tr>
<td>4</td>
<td>Block interleaving with single disk check. Level 3 with addition of data striping across all drives within a block. Similar to level 3, RAID 5 stores data on redundant disks, but in independent read/write operations, not in parallel. In addition, level 5 includes parity information that is distributed across all drives in the array. Extremely fault tolerant.</td>
</tr>
</tbody>
</table>
Universal Drive Terms and Skills

There are a few universal skills and terms that will be the same across any drive you might want to use. These skills are basically the same for IDE or SCSI, and for SCSI-1 through SCSI-3. They cover preparing a disk, dividing it up, and keeping it running. We'll even tell you what your hard drive has in common with 8-track tapes, Chinese food, and the Allied Control Commission's division of Germany at the end of World War II. Don't believe us? Read on.

Basic Drive Vocabulary

All storage devices and drives on your computer store information as ones and zeros. That's the only language they understand. You may already be familiar with how information is stored on CDs since you've used those for playing music for years. (Those of you still using 8-track tape players, hold on. We'll get to you!) A CD uses little bumps and valleys to record the ones and zeros to store music. As the disk spins, a laser bounces off of the reflective surface and registers either a one or a zero, a peak or a valley. CD-ROMs work the same way, except they hold data instead of music.

The hard drive works in a very similar fashion but isn't nearly as high-tech. There are no lasers in your hard drive. Instead of a spinning optical disk, it uses a hard, metal disk that is coated with a layer of magnetic material. It works a lot like your cassette tape or even 8-track tape. (Do you still have one of those?) A magnetic field from your hard drive's read/write head changes the magnetic field on the surface of your hard disk. When you pass the field back over the read/write head, the Mac sees the field fluctuations as ones and zeros and reads the information stored there.

Your Mac has to divide up the disk to make sense of all those bits of data. It does this by dividing the disk into tracks, sectors, and blocks, as shown in Figure 12-4. The disk itself is divided into concentric circles.
like an archery bull’s eye. These sectors are further divided into smaller segments called sectors, much like the pattern on a dart board. Finally, sectors are made up of your Mac’s smallest division, blocks. For our purposes, treat these blocks like take-out Chinese food. Files are written over several blocks in much the same way your Moo Goo Gai Pan dinner is divided into several little boxes. Each box contains some part (rice, entree, egg roll) of your entire meal. On your drive each block contains some portion of your entire file. This can actually create some serious drive weirdness where file sizes are concerned.

No matter how large your drive is, the disk is divided into equal-sized blocks. For a 1-gig drive that is typically 32K. If you have a file smaller than that, then it still takes up 32K. Look at the information on three different files on a 1.1-gig hard drive shown in Figure 12-5. Since
the drive is a little over a gig, the smallest block is slightly over 32K at 37K. Each of these files takes up the same space on your hard drive regardless of how big they really are. You can make block sizes smaller by partitioning your hard drive.

**Preparing a Drive**

When you first get a drive, you have to prepare it for use with your Mac. You do this with two separate procedures that are often done at the same time. This leads lots of people to confuse them. The first is *formatting* your hard drive. This term has become interchangeable with *initializing* your drive. Because of this, you may sometimes hear it stated more specifically as *low-level formatting*. When you do this, those magnetic fields on your drive surface all get wiped and the drive’s sectors, blocks, and tracks get laid down anew. Also any bad spots on your hard drive are detected and marked as *bad blocks*. This keeps your Mac from writing any good data to the wrong side of the tracks. Initializing your drive simply creates a new *directory file* and makes your Mac forget any data that’s there. This directory file is just a pointer to all of your files. In reality the bits that make up your files are still there after the drive is initialized. The process just removes the pointers from the directory so the OS and any applications don’t see them. To really erase anything and ferret out bad blocks, you need a low-level format.

Several small files get written to your drive at this time. In no particular order, they are:

**The Boot Blocks:** Your Mac begins the startup process deaf and dumb. It stores a road map of how to find the Mac’s ROM chips and locate files on your hard drive in the first two sectors of the disk. These are your *boot blocks*. This is where the Mac hides its *bootstrap programs*, which are loaded into RAM at startup. These tiny programs let the Mac “pull itself up by its own bootstraps” at startup. Information in the ROM gives the Mac enough information to load some data off the hard drive. Once
that information is loaded into memory, the wakeup process continues as the Mac pulls more and more data off the hard drive as it needs it.

**Volume Bitmap:** The *Volume Bitmap* works with your *Volume Information Block* to allocate disk space to your files. When you save a file, the volume bitmap looks to the disk and figures out which blocks are free for data storage.

**Volume Information Block:** The *Volume Information Block* file defines your disk's structure, the location of the files discussed here, and information on the name and size of the disk volume. This file also keeps track of your existing folders and the numbers for assigning new ones.

**Desktop File:** Your Mac has to store someplace information on which file goes with which icon. It keeps these pointers in the *Desktop File*. Your desktop file can become cluttered with incorrect information from time to time and must be rebuilt. You do this by restarting the Mac while holding down the ~ + option keys.

**Volume Directory:** When your Mac writes files to disk, it doesn't do so always in a nice continuous block. Sometimes they have to be broken up and written to blocks all over the disk. The information on where the individual parts of a file are is stored in the *volume directory*. You may already be familiar with this breakup of files as disk fragmentation. The volume directory itself is two files called the *catalog b-tree* and the *extents b-tree*.

**Catalog Tree:** The *Catalog Tree* keeps track of three separate pieces of your files. These are the file *header*, *resource fork*, and *data fork*. Not all files have both forks, but all files have headers, which mark the beginning of the file. The resource fork stores the file's icon, PICT, menu, and other resources. These are the parts you can fiddle with in ResEdit. The data fork contains the variable data stored in the file. The catalog tree keeps track of all of them.
There is one more important setting to consider before you are done with the initial formatting process. You can change your hard disk’s *interleave*, which determines how fast the disk is read. Typically, your interleave setting will be 1:1 and you won’t ever change it, but when formatting a drive for a Mac Classic or earlier, you may want to make a change. These older machines just aren’t fast enough to keep up with the rapidly spinning modern hard drive. Setting the interleave to 2:1, for example, lets the Mac read every other sector as the disk spins. You’ll find this setting under your options when formatting a new hard drive. As a rule, ignore it except in the scenario described above.

**Other Drive Settings and Adjustments**

Several other things happen when you format a new drive, things that can never be done after the drive is formatted without affecting the data on it. These actions range from updating drivers to defragmenting the hard drive.

First, you may want to divide up your drive. There are several reasons to do this, which we’ll discuss in a moment. This division is called *partitioning*, and it divides your hard drive in much the same way Germany was carved up at the end of World War II. In much the same way the Allied Control Commission broke a large and unwieldy country into smaller, manageable parts, you can partition your hard drive to make it easier to use and to manage.

Why would you want to? Well, the first and most common reason is for simple organization. You may find it handy to keep all of your documents or shared files on a single partition. This greatly simplifies backups and file sharing. You may also want to break up a drive to decrease the minimum file size already discussed. Simply breaking a 2-gig drive into a pair of 1-gig partitions will reduce your minimum file sizes from 64K to 32K. Finally, you can make your drive more stable by partitioning sections for specific tasks. For example, a partition just for your System Folder makes it easy to later reinstall, defragment, or reinitialize just that partition. You may also want a separate partition for your Photoshop scratch disk or other specific applications.
The catch is that you can't repartition a drive you already have without destroying the data on it. When you break a 1-gig drive into a pair of 500-meg drives, for example, you destroy the volume information files discussed earlier in this chapter and create new ones.

To partition your hard disk, you need to use one of the drive utilities discussed throughout this book. The most popular are Apple's Drive Setup or FWB's Hard Disk ToolKit shown in Figure 12-6. Using Apple's Drive Setup will work on any unmodified drive that came with your Mac. We'll use it as an example here. Any other drive utility you may use will behave in a similar fashion.

To partition a drive, first back it up. You will reformat it to repartition it. Launch Drive Setup and select the drive to partition, as shown in Figure 12-7. To modify the start-up disk, you will need to restart from another drive or disk, such as your Disk Tools floppy.

```
List of Drives

<table>
<thead>
<tr>
<th>Volume Name(s)</th>
<th>Type</th>
<th>Bus ID</th>
<th>LUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lois Lane</td>
<td>SCSI</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Metropolis</td>
<td>SCSI</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>&lt;CD-ROM drive&gt;</td>
<td>SCSI</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>&lt;not supported&gt;</td>
<td>SCSI</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>&lt;scanner&gt;</td>
<td>SCSI</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

This disk can be initialized.
```

Figure 12-7: Select Partition Screen
py or the Mac OS 8 CD-ROM. Select the Initialize button at the bottom
of the screen and choose Custom Setup from the window shown in
Figure 12-8. The current partitioning is on the left side of the window.
You can use the $key to cycle through the various partitions already
on the drive.

From the Current Volumes pop-up menu shown in Figure 12-9 you
can decide how many partitions you want. In this case we’ll select four
to be named British Zone, French Zone, Soviet Zone, and American
Zone after we initialize the drive. The new partitions appear on the left
of Figure 12-10.

![Figure 12-8: Custom Setup Option](image)

![Figure 12-9: Current Volume Pop-up Menu](image)
The FWB Hard Disk ToolKit is a fantastic utility for formatting and partitioning your non-Apple drives, but using it to update the drivers on your internal Apple hard drive could be a mistake. After you do, you can't use Apple's Drive Setup on your drive, you must use an FWB product. This is fine until the next version of the system software comes along. You may have to wait to update your drivers until FWB releases an update. Additionally, you can't use Apple's Drive Setup on your Disk Tools floppy. The best advice: Use FWB for non-Apple drives.
You also will want to keep an eye on your disk’s drivers. These typically aren’t an issue except when you upgrade the OS. Your Mac OS installer should give you the option of updating your drivers when you upgrade. If you are using an FWB or other product, you may want to determine whether there is a driver update available before upgrading. Finally, reformatting your drive leaves all of the blocks scrubbed clean and waiting for data. As you write files to the drive, they are recorded in contiguous, logical order. It is defragmented at this point. None of the files on it is broken up. Over time, as you use the drive, the files will be broken up to fit the spaces vacated by the files you delete. Later, you can defragment your files and restore them to this pristine, logically ordered state.

To do this, use a program such as Norton Utilities, shown in Figure 12-11, or reformat the entire drive. Remember that your Mac’s first inclination is to keep your files together. If you back up your entire hard drive, reformat it, and then copy the files back onto it, then you will have defragmented the entire disk. The Mac copies the files back in nice solid chunks.

Figure 12-11: Norton Utilities
To use Norton Utilities on your drive, launch it and select the Speed Disk option from the main menu. Click on the Check Disk button and Speed Disk assembles a map of the files on your hard drive. This looks a little like multicolored static in the window on the left of Figure 12-12. Clicking the Optimize button sets Speed Disk to reassembling your files into orderly groups of applications, documents, and System files. Defragmenting your hard drive from time to time can improve performance.

![Speed Disk](image)

*Figure 12-12: Norton Utilities Speed Disk*

**SCSI Voodoo**

SCSI is designed with some detailed but reasonable rules, but you occasionally must break them. Like life in general, strange things happen. Like people, SCSI devices interact and can change each other’s mood. Managing this ordered chaos can be a frustrating exercise in repetitive futility.
Take heart in the fact that you probably will deal only with these rules once, when you add a new device to your SCSI chain. Also, these fitful problems hardly ever mean your disk will crash or lose work. The symptoms are usually flaky, skittish behavior.

**SCSI Basics**

There are only two real laws to SCSI. First, don’t duplicate SCSI IDs. Two devices with the same number can cause conflict problems that lead to improper operation. Second, always terminate both ends of the SCSI chain. On your Mac, one end is already terminated inside the computer itself. All you do is make sure there is a terminator at the other end.

Some devices such as the Zip drive have a termination switch on them, shown in Figure 12-13. Many other devices including scanners and the Mac PowerBook in dock mode are terminated inside as well. This means you have only to bookend other devices between them and your Mac. Still others have no terminators at all. This means you’ll need to add an external terminator like the one in Figure 12-14.

![Zip Driver Terminator](image)

*Figure 12-13: Zip Driver Terminator*
Most of today's Macs will have an internal SCSI drive at ID 0, a CD-ROM at ID 3, and the Mac motherboard-actually the SCSI controller itself-at ID 7. Knowing this little fact, Apple recommends you place important devices closer to ID seven. Consult the manual for your drive, scanner, or what have you to determine your specific SCSI ID settings. They usually will be set by a small switch or dial somewhere on the case. It is very, very rare to encounter old-fashioned dip switches or jumpers today, but you may. Mac users aren't very familiar with these as a rule. They are frustratingly enigmatic ways of changing your settings on a circuit board.

Finally, your Mac sports a DB25 SCSI connector that requires a DB25M SCSI cable like the one shown in Figure 12-15. This is the same connector and cable used on the external SCSI Zip drive. Many other devices will use the larger Centronics 50-pin connector. You may need a cable with both connections on it, like the one shown in Figure 12-16. You can mix-and-match standard SCSI cable sizes at will with the proper adapters and cables.
SCSI Problems

Although it would be nice to think of your SCSI chain as a logical entity and model citizen of your computer's world, often it simply isn't. In isolation, SCSI devices tend to obey the rules and may work well in pairs. Other SCSI devices tend to dominate the SCSI chain by being at the end or simply by refusing to do anything on any SCSI ID other than a single, preset one. Finally, in groups of three or more, strange politics can develop amongst your SCSI drives, scanners, and what have you. Like people, they behave well singly but can become an unruly mob when grouped together.

Problems range from drives that don't appear at startup to strange Mac behavior. SCSI problems can cause sudden crashes, lock-ups, and other skittish behavior. Drives that start to corrupt data can be a sign that something is wrong in the SCSI chain as well.

That is the origin of the phrase SCSI Voodoo. When the logical side of SCSI fails, Mac users find themselves performing a ritual dance of removing and reattaching everything to see what's wrong. Many times it
can seem as if this very ritual, not any logical steps, solves the problem. When experiencing almost any problem with your Mac, unplugging the SCSI chain is a good idea. If the problem persists, this gives you the added assurance that the problem isn’t caused by something plugged into your Mac. If the problem goes away, you may need to begin the ritual.

First examine your SCSI setup. Make sure you have obeyed all of the rules. The shareware tool SCSI Probe, shown in Figure 12-17, can be invaluable for this sort of detective work. It will tell you what SCSI devices you have mounted and where they are on the SCSI chain. Look for termination problems and double-check your cable connections. They can wiggle loose.

If everything looks OK, then it is time to start the dance. Plug each device into your Mac individually and see if the problem occurs. Don’t forget to terminate. Next, try
reordering the chain. Move things around and see what happens. Don’t change IDs. If reordering doesn’t help, try changing the ID numbers. Make sure you don’t duplicate any SCSI IDs.

If none of that worked, you might try using an extra terminator in your SCSI setup. It sounds weird, it breaks the rules, and it just plain makes no sense, but often it works. A pass-through terminator looks like a regular terminator with a plug on both ends. It terminates and passes the signal on. Often, terminating before the last device on the chain and after it will solve SCSI problems.

More often than not, you’ll find the problem gone and absolutely no clue as to why. Maybe a cable was loose. Maybe an ID was wrong. Maybe your drives are just plain stubborn. Whatever the reason, performing this little ritual often clears up the problem. Try it.

**Beyond SCSI**

Of course, technology won’t stand still. Expect to see SCSI-3 and SCSI-2 to become more common. Though relatively cheap, IDE doesn’t offer the speed that more applications are demanding. Beyond these technologies, look for new technologies.

The biggest of these is *FireWire*. Also known as *IEEE 1394*, FireWire has already started to appear and not in hard drives. The first FireWire peripherals were video players and video cameras! The new FireMAX PCI cards and Sony’s DCR-VX1000 camcorder, for example, are available for your Mac and more is on the way. In addition, the FireWire standard promises to change the way everyone connects to digital devices. This is bigger than just Mac owners and bigger than just computers. All of the big names in consumer electronics are involved. Right now, the capture cards are cheaper than many other capture options on your Mac, but the camcorders, tape decks, and such are way outside what you would normally expect to pay.
With FireWire, top speed should evolve into the 100-megabytes-per-second range and beyond. You can attach up to 63 devices to your FireWire connection, and you don't have to fiddle with terminators, IDs, or SCSI conflicts!
preventive maintenance

THE OLD-WIVES' TALES ARE TRUE, AND THE FOLK WISDOM OF your grandfather should be taken to heart. A stitch in time does save nine. An ounce of prevention is worth a pound of cure. Why wait until disaster strikes to start a few good habits? The key to preventing disasters on the Mac is simple familiarity. Knowing what to put into your System Folder and keeping a clean work environment can be a big start.

There are basically five places you can have an impact on your Macintosh's performance:

2. Routine Drive Maintenance.
5. RAM Maintenance.

Be prepared and aware, and your Mac problems should be infrequent and minor. Even if problems do occur, the tips here should help you recover quickly. If you are already having minor trouble, see Chapter 8 for troubleshooting tips, and go to Chapter 16 if disaster has already struck.

Your Mac's Environment—Yard Work

No, mowing the lawn won't improve your Mac's performance, but like
yard work at home, taking care of the outside of your Mac can work miracles on appearance and response. Simply cleaning regularly may have a surprising effect on your machine’s performance.

If you are of the opinion that dirt is a minor and obvious problem that anyone would notice, then let me share a couple of experiences with you.

While working for a CD-ROM manufacturer a few years ago, I inherited a 17 inch monitor from a departing coworker. I was complaining about how fuzzy and dull the screen looked when my boss leaned over and ran a finger down the screen. He removed a perfectly uniform layer of blackish dust. There on the screen was a brilliant finger-shaped smudge in a sea of gray.

“I think,” he said with a grin, “I might know what the problem is.”

In another incident at the same job I opened a coworker’s Macintosh LC to find out why the fan had stopped. She had noticed that it ran hot. Real, real hot! What I found was a hairball that could best be described as two-thirds of a smallish cat. It had completely stopped the fan and matted itself around the components on the motherboard. This hair had turned into something resembling felt and was insulating the entire motherboard. After a good vacuuming, the fan worked again and the Mac ran much cooler. —Sandy Clark

Don’t skip this section or put off the cleaning until next spring, either. In addition to maintaining its high performance level, a clean Mac is a saleable Mac. Like a clean car, a clean computer is more valuable.

Every opening in your Mac—from the fan intake to the serial ports—is a potential source of trouble. Look at Figure 13-1, and keep these openings clean and free from obstructions. That may sound like common sense, but anyone with on-site consulting or maintenance experience will tell you horror stories of grimy, clogged, hairy machines. Treat your Mac nicely and it will return the favor.

Those holes in the case are there for a reason. Your Mac needs to stay cool to operate. The very first Mac had a few overheating problems, but
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Figure 13-1: Mac Openings

unless you own one of those Mac 128 or 512 machines, you probably won’t need to add another fan. Simply keep the vents on your Mac clean. An occasional vacuuming won’t hurt anything. Just make sure the Mac is plugged in and shut off. This keeps it well grounded in case all that flying dust and air kick up a static charge. However, use care while you are inside the case. If the computer is plugged into the wall, there are 110 volts coming into your switch. Don’t touch the power connection with your finger or anything else.

Don’t pack drives, books, software, and other clutter around your Mac. Many a Macintosh has suffered from the cluttered office. If your Mac is currently crammed back into a cubby hole and surrounded by masses of cabling, manuals, and boxes, it may be time to clean house. Any obstruction to the airflow around your CPU or monitor could cause problems in the long run.

Ports and connectors should be kept clean as well. If something drastic happens, such as a broken pin or connector, take care of it fast. Your Mac’s SCSI drives are robust and well-mannered, but you don’t want to tempt fate by crossing wires. You can cause a perfectly good monitor to roll belly up or act unpredictably with a loose or broken connector. Jiggling the monitor cable to clear up the picture is not standard procedure. Pull that Mac out and see what’s wrong.
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Make sure you don't have anything applying pressure to your cables. If your Mac is pressed flat against the wall, the LocalTalk, PhoneNet, printer, modem, and monitor cables can get bent or broken. A quick check of this external real estate can save you several hundred dollars' worth of repairs.

Additionally a handy bottle of mild, all-purpose cleaner and some paper towels can work miracles. Less dust on the desk means less dust in your mouse. Less dirt on the screen means a brighter picture. Less crud in the vents means a cooler Mac. This isn't meant to imply that you keep house like Oscar the Grouch. Dirt happens.

A wavy monitor is another externally influenced problem. Power supplies, speakers, and halogen lamps can interfere with your monitor's performance. If you notice a permanent dull or discolored area on your screen, make sure it isn't sitting on, under, beside, or even in a speaker. That subwoofer you bought is not an end table. The magnetic field from the magnet in even medium-sized speakers can distort the screen image.

Don't spray anything on your monitor or screen without first checking the manufacturer's instructions. Some monitors have etched or coated surfaces that you can remove with certain chemicals such as bleach, ammonia, or one of those industrial-strength cleaners you keep under the sink. Make sure you check before you spray.

If the monitor waggles or waves in a rhythmic or repeating pattern, look for an electrical influence. You may need to move it away from the stereo, CPU, or lamp. As a last resort, try plugging it into another circuit inside your home.

While we are talking about electrical and power problems, it might be a good time to mention power supplies and surge suppressors. Adding an *uninterruptible power supply*, or UPS, can be a shrewd
investment. A UPS like the one in Figure 13-2 is basically a big case with a big battery inside. First, a UPS provides the highest level of protection from surges and spikes in most cases. Read the manufacturer's literature on this topic. Second, if the power goes out or someone switches off the breaker or flips the switch in your room, you don't lose what you are working on. A UPS can provide power for a few valuable minutes and let you get out of what you are doing without data loss.

Mice and keyboards get dirty. Short of running them through the dishwasher, what can you do? A small vacuum or even a soft long-bristled brush can work wonders on a keyboard. Everyone from Radio Shack to Wal-Mart sells a small vacuum for cleaning electronic equipment. Prices vary wildly, but good deals can be found. Just shop around.

To clean the keyboard with a brush, first disconnect it from the Mac and then turn it upside down. Run the brush down the length of the keyboard and around the numeric keypad several times. For a horrifying display of uncleanliness, do this over a white sheet or cloth. You will be amazed at what's in there. Using the vacuum, you shouldn't have to tilt the keyboard, but doing so may loosen stubborn grime.
Never use your Mac in a thunderstorm unless you have a UPS. Why? If the power were to flicker off, the resulting surge when it came on could damage your Mac. Sometimes these surges can happen so suddenly that you wouldn't even have time to pull the plug. Of course, if you are experiencing nearby lightning strikes, shut down your Mac and unplug everything from the wall. Never unplug your Mac while it is copying a file. This is the most dangerous time to fiddle with the power because your Mac could write the wrong data to your desktop or catalog files and cause a disk crash.

Mice get gummed up as well. We'll look at the standard Apple ADB mouse shown in Figure 13-3, but these instructions should apply to your mouse as well. Consult your documentation for any tips on cleaning your specific mouse. Also, what holds true for mice is generally true for trackballs in reverse. A trackball is just an upside-down mouse.

On the bottom of your mouse you will notice a plastic ring surrounding the ball. Turning this ring counterclockwise should unlock it and free the ball. Don't lose any parts! Simply wipe these parts off with a damp cloth and dry them well. If you have spilled liquid, a little mild detergent may be in order. Either way, do not reinsert a wet part into your mouse.

Inside the mouse you will see some tiny rollers. Three are common, but that may vary. Using a cotton swab or even a fingernail, wipe off these rollers. You may find that an encrusted ring of grime has grown there. A little alcohol on a cotton swab should loosen this mouse muck enough to remove it. When you are done, replace the ball and ring. Lock the ring into place by turning clockwise and you will have a clean, responsive controller again.
Routine Drive Maintenance

There are a number of housecleaning chores you can do inside your Mac to protect yourself. The hard drive is the best place to start. From changing the icons on your desktop to updating the drivers buried in your hard drive, there is plenty to work with.

Icons are one of the easiest things to modify on your Mac. If you've already read Chapter 6, then you know that all you need to do is cut and paste a new icon into a file or an application's Info box. The problem comes when you have dozens and dozens of custom icons installed.

Oh, this won't kill you, but it will slow things down. Every time the Mac draws or redraws a screen, it has to look up the icons you are using. If you choose to leave the default icon in place, the screen redraws considerably faster. This becomes very apparent when you open a window from a CD-ROM, a Zip drive, or across a network. A few hundred custom icons can slow your Mac to a crawl. Use custom icons with restraint and you'll find your Mac feels faster.

Another source of benign neglect is general disk clutter. Most people just don't throw things away. Clean off those applications you seldom if ever use, and archive information you aren't likely to need. For example, are you actually planning to read those transcripts from an online chat you were involved in two years ago? Why are you keeping 45 megabytes of Marathon utilities on the hard drive when you don't play Marathon any more?

Another place to look for clutter is inside the System Folder. Check out your Preferences Folder and you will probably see something like Figure 13-4. Deleted applications don't automatically toss out their preferences, control panels, and extensions in most cases. One preference file is small. A couple of hundred preference files are not.
After you've done that cleaning, rebuilding the desktop is in order. You don't normally see the desktop file your Mac uses to keep track of the file types, icons, creator codes, and location of every file or application on your hard drive. In fact, every disk from your CD-ROMs to a floppy has a desktop file on it. For more on these terms, see Chapter 5.

To rebuild the desktop file, restart your Mac and hold down the `Option` keys until the Mac asks if you want to rebuild the desktop as in Figure 13-5. This chore is occasionally needed because your Mac sometimes loses track of files. This is doubly true if you have a cluttered hard drive or do a lot of downloading. If you ever notice that folders and applications mysteriously revert to their default icons, then it is definitely time to rebuild.
Unfortunately, just rebuilding the desktop at startup won’t completely rebuild the desktop file. A small portion of the file remains unchanged. To completely rebuild the desktop, you should use a program such as Micromat’s TechTool, shown in Figure 13-6. You will see TechTool discussed at length below in the Be Prepared section of this chapter. You can download a free copy or find it on many shareware and user-group CD-ROMs. When TechTool rebuilds the desktop, it starts from the bottom up.

No matter how fastidiously you clean your hard drive or rebuild the desktop, it will slow down. This happens as the files and applications become scattered across the disk. This is called file fragmentation. You contribute to it every time you delete a file, like those preferences we discussed above.
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When you threw them out, you created free space on the drive. The Mac will use these little "holes" of free space first. If the entire file you are saving doesn't fit in one of these holes, then the Mac breaks it up and writes a few small pieces all over the place.

Now, compound that with the behavior of a graphics or disk-intensive program like Photoshop. While it is running, it writes a scratch disk file to your hard drive. Sometimes this is called a swap file in other programs. It is a temporary form of storage similar to virtual memory, which we will discuss under RAM Maintenance below. It can write and rewrite this file dozens or hundreds of times during normal operation, accelerating disk fragmentation.

Another major suspect with not only fragmentation but disk corruption is your Web browser. Both Netscape and Internet Explorer are very disk intensive since they are constantly writing small pieces of data to their cache files in your System Folder.

Instead of reading a file from beginning to end in one pass, now your Mac has to skip around to find all of the parts of the file. That slows it down. Symantec builds the premier tool for repairing this sort of damage. Speed Disk is part of Norton Utilities, and as you can see from Figure 13-7, it is dedicated to defragmenting your hard drive. You will see it discussed further under Basic Toolkit below.

Another drive danger zone is potential corruption of files or the drive itself. Files become corrupted when a random error or mistake is made when copying them. A single missing bit can make a file unreadable. File corruption is actually rarer than it is sometimes thought to be. Preference files, fonts, and your browser cache files are the most likely files to become corrupted. The real danger comes when corruption starts to disrupt the drive's operation itself.

To fix these problems, your first line of defense is the Disk First Aid utility available on your Mac OS 8 disk or any other Apple System disk. Disk First Aid sweeps your drive for major and minor corruption and
problems. These will be identified with cryptic messages about "BTree" problems and restored catalog hierarchies. All you really need to know is that it works.

Symantec's Norton Utilities does much the same thing. In fact it will usually find errors the Apple Disk Utility will miss. Make sure to use the latest version of Norton and that it works with the current version of Mac OS. Using an older version of Norton on a newer System can actually make things worse.

Try to perform at least one of these sweeps every couple of months. The best way to conduct one is to boot from another disk. That will ensure that your utility of choice can access fully the disk you want to repair. Sometimes the boot process loads software that makes it difficult or impossible to access parts of the boot drive. Figure 13-8 shows you what to expect if you try running Disk First Aid on your active start-up disk.

Figure 13-7: Norton Utilities Speed Disk Display

Figure 13-8: Disk First Aid Message From Active Desktop
A final way to keep your drive happy is to keep it up-to-date and in sync with your System software. Every release of the Mac OS in the last three years has suggested that you update the device driver for your hard drive before you install. This goes for System 7.1 through Mac OS 8. If you have never done this but you have upgraded your System software, then you should probably do it soon.

The driver controls the way your hard drive reads, writes, and interacts with your System. To update this underpublicized but crucial piece of software, use the latest hard disk utility for your drive. On the Mac OS 8 disk, you will find Drive Setup in the Utilities folder as shown in Figure 13-9. This will update your disk drivers for any Apple-formatted drive. To update the drivers on a disk you have initialized with FWB's HardDrive Toolkit, On Spot, or other disk utility, use the latest version of their software.

![Figure 13-9: Drive Setup Display From Utilities Folder](image)

Apple's drive-setup utility is smart enough not to install incompatible drivers on an earlier version of the System software. See Figure 13-10. It will bring your hard drive into sync with Mac OS 8 as shown in Figure 13-11.
Drive Setup cannot be launched on this computer with a system prior to Macintosh System Software 7.1.2.

Figure 13-10: Apple's Drive-Setup Utility

![Drive Setup Utility](image)

Driver update was successful.

Initialize...

Figure 13-11: Drive Setup OS-8 Sync Message

There are a lot of things you can't do in this chapter if you have the Mac Duo 2300 or any other Mac with no CD-ROM or diskette drive. To really clean off one of these machines, you need to be able to boot from somewhere other than the hard drive. Apple and several other manufacturers make docks for these machines like the Duo Dock Plus shown in Figure 13-12. If you don't have one yet, consider getting one. In addition to the ability to add a CD-ROM, the Duo Dock Plus has a built-in floppy drive.

Figure 13-12: Apple Duo Dock Plus
CHAPTER 13: PREVENTIVE MAINTENANCE

Software Maintenance

Keeping control of all those headstrong applications is a must for preventing trouble. For one thing, plug-in files and System extensions can lead to bloated applications and less disk space. Software also gets updated, and older versions of an application may have problems you need fixed. If you are a long-time Mac user, then you may even have a few pre-PowerPC applications still on your hard drive.

Software on a PowerPC-based Macintosh can be one of two types of applications, native or emulated. Power Macs are smart enough and fast enough to run programs written for the older 680x0 Macs. See Chapter 1—Meet the Mac—for more information on this bit of Mac history.

Connectix Speed Doubler 2 may be a godsend if you run non-native applications on your PowerPC Macintosh. It runs faster than the built-in emulator Apple supplies. It also accelerates network transfers of information and speeds up disk access to your Zip disks and other removable media. See the Basic Toolkit section below for more information on this useful Mac tool.

Though your Mac can run any Mac OS software, the applications are greatly speeded up if they are written in native PowerPC code. Sometimes you will encounter FAT binary files. These programs contain both PowerPC and 680x0 code and will run on either machine.

Upgrading to native applications where available can speed up and clean up your System. According to Apple's Website, 2,400 native PowerPC applications exist, and nobody has manufactured a non-PowerPC machine in a couple of years. If you have been waiting for the right time to upgrade your applications, then that time has come.
In addition to running faster, newer software often runs cleaner. Manufacturers fix bugs and conflicts all the time. It may be that the cool toy you just can’t live without is quietly destroying some section of your drive a little bit at a time. Always upgrade, especially if the manufacturer offers the option for free.

Another factor in software maintenance is plug-in bloat. Everything from shareware games like Escape Velocity to Internet browsers like Netscape use *plug-ins*. Plug-ins are small programs that run inside another application to enhance it. This lets third parties add abilities, scenarios, tools, and tricks to applications. It also creates an awful mess.

Any Photoshop jockey will gladly show off collections of plug-ins if given a chance, but how many of those are actually needed? In any program, you should ask yourself whether that file is absolutely necessary.

Multiple copies of the same file or application are another common occurrence. Quick, how many copies of SimpleText do you have on your Mac? Sometimes, a program gets reinstalled and deleting the old copy gets overlooked. Other times you may keep the old version of a file, “just in case.” Clean off those extras and free up the space.

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OK, if you really want to get lean, here are my personal tips. First, strip those FAT files. This works both ways. If you are running an older 68030-based Mac for instance, you can toss the PowerPC code in your applications. This alone will save several megabytes on most Macs. Second, do you ever use the installed help files or templates that come with your programs? If not, toss them. How about Internet applications? What are you planning to do with 78 megs’ worth of downloaded pictures, Web pages, and shareware anyway? I try to keep my Internet applications weeded down to just the ones I use. Usually, this is FTP, email, and a Web browser. Toss everything you don’t use. Finally, get rid of those fonts. I don’t know why, but it seems as though anyone who has owned a Mac for longer than two years has got 80 to 100 fonts installed. Clean those out. If you need to write a ransom note, you can always load the font to do it later. —Sandy Clark.
Your System Folder attracts clutter like a magnet. We've already discussed cleaning out preferences. Try to be aware of what's in there and what got installed with what. See Chapter 7 for more insight into your System Folder. Get rid of any extensions, control panels, and extra folders that you know you don't need any longer. Claris, for example, installs a folder that you don't need if you aren't using any of its products. Netscape and Internet Explorer like to clutter up the System Folder as well. If you have quit using one browser or the other, then you can toss the extra System components it installs. In the case of Netscape, this can include several megabytes' worth of cache files.

Other candidates include anything dealing with file sharing if you don't plan to connect your Mac to another Mac any time soon. You can toss unneeded printer drivers as well. If you don't own a StyleWriter, then anything labeled StyleWriter is fair game.

Several helpful programs can assist you with this task. Aladdin's Spring Cleaning is one such program. Using type and creator codes among other things, it can identify and delete any unneeded preferences, completely uninstall applications, suck unneeded code from FAT binaries, and generally set your house in order. PrefCleaner is a shareware application that cleans out just your Preference folder, and if you look around, you will find dozens of others. See Chapter 23 for more tips on finding shareware and software. See the Basic Toolkit section below for more information on utilities such as these.

You can also install utilities to help you resurrect your software if you crash the disk or throw away something important. When you empty the trash, you don't actually erase the information, you just remove its entry from the disk catalog. You can restore these trashed files if another file hasn't been written into the same location.

Again, Norton Utilities is the most common tool for the job. The Unerase component of Norton lets you resurrect files on the hard drive.
Figure 13-13 shows Unerase at work. FileSaver, also included with Norton, keeps track of what you throw away, helping you restore at a later date. See Chapter 16 for more information for recovering a file you have thrown away.

The best thing you can do to protect your files is to back them up. You can do this by hand with floppy disks, but the task gets tedious quickly. What you need is a utility to automatically back up your hard drive for you. One popular application for backing up your data shown
in Figure 13-14 is Retrospect from Dantz software. With Retrospect you can back up your hard drive to almost anything from DAT to CD-R (recordable CD-ROM). In fact, Retrospect is the number-one backup utility on the Mac. If you own a Zip drive, your Zip tools disk should have a similar utility for backing up to Zip disks, but be warned, Zips are not considered an *archival media*.

For all of their handiness, Zip disks and other removable cartridge drives such as magneto-optical or Syquest cartridges are fine only for a short-term backup. You should move to something more reliable for long-term storage. The two best choices are tape and CD-R. Tapes don’t tend to have as many problems as disks. Several versions of tape drives exist for just this reason. Of course CD-R backups are extremely reliable, though at present the technology is a little more expensive than tape.

The next thing you need to determine is how often to back up your work. For a project-intensive graphics department, every day may not be unreasonable. At home monthly should do in most instances. The bottom line is how much would you lose if the machine went down today?

It is also important to develop a schedule and stick to it. A common routine is to back up every week and keep the tape in another location. A more intensive version of the same routine is to back up work every day on-site and then walk a copy home each week.

No matter which strategy you follow, periodic backups of busy workshops and heavily used data are the best way to ensure that you hit the ground running after a disaster. Resurrect your data from the archive at least once every couple of months to make sure there are no problems in your procedure that need to be fixed. You would hate to discover after disaster struck that a minor technical glitch had kept you from saving anything.

One final backup tip relates to commercial software. It is important to back up your commercial software diskettes as soon as you open the
package. Floppies can become defective, break, or get erased. Having an archived set of your Quicktake Camera software, for instance, can save you time as well as frustration if you experience problems with the original diskettes later. This holds true for printer drivers, telcom diskettes, even fonts or utilities. As more and more products are shipped on CD-ROM, this becomes less of an issue.

The ultimate tool for dealing with floppies is ShrinkWrap, shown in Figure 13-15. This amazing piece of shareware was written by Chad Magendanz and can be used in education, individual, and nonprofit environments for free. The simplest way to see what it does is to play with it. Shrinkwrap will make a disk image of any disk you drop onto it. Later you can use this disk image to make an exact duplicate of the original disk. Shrinkwrap is completely compatible with Apple's DiskCopy utility as well.

Figure 13-15: ShrinkWrap Shareware Software Display

Shrinkwrap's biggest strength may be its ability to mount disk images as if the disks were actually in the drive. For one thing, with some Mac models such as the Duo 2300C, this is the only way to install floppy-based software without a duo dock. It also lets you mount virtual copies
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of an entire set of disks at once. This is much faster than reading from an individual floppy, and you save the time you would have spent swapping floppies.

**Virus Prevention**

Protecting your Mac from viruses is one of the easiest things you can do. In fact the threat to your Mac from a virus is much lower than on a Dos, Windows 3.1, or Windows 95 System. There are only 36 known Mac viruses. Remember that's 36 viruses in 14 years on the platform! Two of those are even cross-platform Microsoft Word macro viruses. We're not sure why this is so, but the fact is you are simply in much less danger from a virus in the Mac world.

That said, the first order of business is to keep viruses out. Virex and Symantec AntiVirus for Macintosh (SAM) are both strong commercial products. Virex will even automatically scan files you download. The best tool for its cost, though, is Disinfectant. This freeware utility is perfect for checking a suspect floppy or hard drive. Best of all, it's free. Of course, if you already have SAM or another commercial product, you probably don't need Disinfectant. On the other hand, sweeping your drives with multiple products is like having two medical insurance policies that will both pay off in the event of a medical expense.
To sweep your Mac for viruses, first boot from another disk such as a CD-ROM or disk tools. Otherwise you might not be able to fix an infected file, as shown in Figure 13-16. For tips on booting from another disk, see Be Prepared later in this chapter. By booting from another disk, you free up your System software for a thorough physical by the virus software.

![Kryptonite System Folder Finder]

### File infected by nVIR A.
Last modification 2/23/97, 12:59:29 PM.
### This file is busy and cannot be repaired.
### Restart using a locked Apple "Disk Tools" disk and try running Disinfectant again.
### WARNING: This file is still infected!

*Figure 13-16: Can't Repair Infected Disk Message*

Next, launch Disinfectant or your chosen application as shown in Figure 13-17 and wait. Disinfectant generates a report that tells you what, if anything, it found.

![Disinfectant Software Display]

*Figure 13-17: Disinfectant Software Display*
RAM Maintenance

Several tricks dealing with your Mac’s RAM can extend or improve performance. A seldom-mentioned type of RAM to keep an eye on is parameter RAM or PRAM. This tiny amount of memory is kept alive by your Mac’s internal battery. That’s where your Mac remembers the date and time, among other things. Sometimes PRAM becomes corrupted or a setting contained there refuses to change. To clear it out, you need to perform a procedure known as zapping the PRAM.

You will find a list of reasons to zap PRAM in Chapter 8 – Troubleshooting. When you zap it, you lose some control panel settings, so be prepared to reset your location, date, time, desktop pattern, and monitor settings.

To zap the PRAM, start or restart while holding down the ⌘ + ⌘ + ⌘ + and ⌘ + keys. Your machine will begin its normal routine and then chime and restart again. That’s it, you’ve zapped the PRAM. Some people swear that continuing to hold the ⌘ + ⌘ + ⌘ + keys down so that the Mac zaps the PRAM several times gets it “extra clean,” but we can find no practical evidence that this is true.

Another way to zap the PRAM is with Micromat’s free TechTool. With TechTool, you can even save your PRAM settings and restore them. You’ll learn more about this infinitely useful device under the Basic Toolkit section below.

Meanwhile, up in your regular RAM watch out for RAM fragmentation. Similar to file fragmentation mentioned above, RAM fragmentation occurs when your memory becomes broken up into small unconnected chunks. Unlike files on disk, information in RAM needs to be in one contiguous block. After running several programs, it is possible to have enough RAM free to run an application and still not be able to launch it!
When you start a program it sets aside its own slice of RAM as shown in Figure 13-18. You can check this by going to the finder and selecting About This Computer from the Apple menu. (Note that in Systems previous to OS 8, this choice is titled About This Macintosh.) When you quit, the application frees its slice of RAM. This memory can be separated in RAM by the applications you still have open. If the next application you launch can’t fit into the space vacated by the application you quit, it has to skip that RAM and look for a larger chunk.

![Figure 13-18: Application RAM Allocation Display](image)

For example, say you start up and run Graphic Converter, Microsoft Word, and ClarisWorks in that order. Next, you quit Word and try to start Photoshop. If Photoshop doesn’t fit into the block of RAM vacated by Word, it has to stake out its own partition in memory beyond ClarisWorks. It is completely possible that you could have enough free RAM to launch Photoshop but be prevented from launching because that RAM isn’t contiguous.

Try launching applications you will be using all day early in your routine. If you are a big ClarisWorks user, launch it first so it can stake its claim to a slice of RAM early. Some Mac users even have complex lists of the exact order in which they launch their applications. Be as obsessive as makes you comfortable.
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This problem is compounded by the fact that applications don't always play nicely with the other children. Some will overwrite sections of RAM at will or refuse to give up their chunk of memory when they leave. You are somewhat helpless in the face of this sort of behavior, but being aware of it can explain occasional weirdness.

On the Mac you have complete control over how much RAM an application uses. You change that setting, as explained in Chapter 6 - Customizing Your World, from an application's Info box. This is also discussed in detail in Chapter 5—Finder and Menus. Just select the application and type [+] to call up the settings shown in Figure 13-19. Increasing the memory allotment of RAM-hungry graphic utilities and Web browsers can make them run smoother. Larger allotments should be considered if you are seeing messages like the one in Figure 13-20 but still have free RAM available when you check About This Computer from the finder.

Avoid excessive virtual memory if you can and make sure you run virtual memory on your PowerPC-based Mac. What?!? That sounds like a contradiction, but it is true. Virtual memory is discussed in detail in Chapter 6. For our purposes here, we are interested only in whether or not it causes problems.

Under virtual memory your Mac treats a portion of hard-drive space like RAM. It swaps applications out of real RAM to this location on the fly. Using it to create an extra 20 or 30 megabytes of RAM can help you in a pinch, but it generally slows down your Mac.

Figure 13-19: Application RAM Allocation Settings Display
At the same time, virtual memory can actually help your native PowerPC applications run. This is because of one major difference between PowerPC and 680x0 applications. When you ran ClarisWorks on your old 68040-based Mac, it would load parts of the code it needed on the fly. If it wanted to print, for example, your application would load the code it needed and then dump it after it was done. That meant it could occupy less space in RAM, swapping out just the code it needed. PowerPC applications load themselves completely when you launch them.

Virtual memory lets these applications swap out unused code to the hard drive again. For example, look at the Photoshop info box in Figure 13-21. Notice what it says at the bottom. By turning on virtual memory, you can save almost 5 megs of RAM! You don't need to set aside much virtual memory either. Look at the difference in the Info box after restarting with just 2 megs of virtual memo-

Figure 13-20: Low RAM Error Message

Figure 13-21: Photoshop Application Info Box
ry turned on in Figure 13-22. You just got several megs of free RAM!

RAM Doubler from Connectix does the same thing as virtual memory without using the hard-drive space. RAM Doubler uses a form of memory compression to shrink the space that applications occupy in the RAM itself. It works fine for most applications but falls short when dealing with some graphics-intensive applications. Some programs just like to control their own RAM and aren't interested in sharing control with RAM Doubler.

Adding RAM is one of the best things you can do for the overall speed and feel of your Mac. You shouldn't count on virtual memory and RAM Doubler to meet all of your extra memory needs. Nothing beats the versatility, speed, and convenience of extra real RAM. For more on this subject, check out Chapter 2 for upgrade strategies and Chapter 11 for instructions on adding more RAM.

Be Prepared

Basic Tune-up

Here is the basic checklist for a tune-up that will keep your Mac problem-free and greatly reduce your chances of a disaster. This tune-up uses applications from the Basic Toolkit below and tips from the rest of this chapter above. You might consider following this routine, in this order, every few months:
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1. Back up everything on your machine.
2. Run the latest version of Disk First Aid.
3. Upgrade software and drivers.
4. Clean your machine and its environment from the outside of the case to the contents of the hard drive.
5. Rebuild the desktop file.
6. Defragment your hard drive.

Now we will examine each step in detail. Excluding Step 1, which you should do regularly anyway, this whole procedure can be done in two hours or less if you have the tools on hand. Though this will fix problems you already experience as well as ones you don't know you have, it shouldn't be used specifically to fix a problem. If you are experiencing regular trouble already, see Chapter 6–Troubleshooting. If you have already experienced a crash or lost part of your drive, you will want to see Chapter 14–Disaster Recovery.

**Step 1:** Backing up is the first step in any serious project that tinkers with your Mac. Paranoia breeds security. You should already have backed up recently anyway!

**Step 2:** Run Disk First Aid or a similar utility such as Norton Utilities. This will fix any problems before you start a bunch of disk writes and rewrites in the next steps.

**Step 3:** Software upgrades can be saved until one of these regular sessions. This is doubly true if you don't absolutely need the new features they provide or aren't experiencing trouble with the older versions. Keep your eyes open for new drivers or a new version of your hard-disk software. This could be Apple's Drive Setup or a third-party program like FWB's Hard Drive Toolkit. This is a good time to upgrade your System software to Mac OS 8 or beyond.

**Step 4:** You can start this step by cleaning the outside case with a dust cloth while those upgrades from Step 3 install. Then move inside to
erase unwanted files from your hard drive. Toss those unneeded preference files. Trash those unused applications.

**Step 5:** Rebuild the desktop file now that you have added new software and removed the clutter. Using TechTool is the best bet, but good ole `⌘ + option` at startup works just fine. You might also zap the PRAM at this point as a matter of thoroughness. Hey, TechTool is open anyway . . .

**Step 6:** Finally, defragment the hard drive. Again, Norton Utilities provides the best tool for this with Speed Disk. You may be able to find a shareware alternative if you look around. Now you can get busy cluttering up your machine again.

About every two years or so you might want to completely overhaul your Mac from top to bottom. Initialize the hard drive, reinstall a clean System and all your software, and generally start over. This more drastic step is discussed in Chapters 14 and 15 as both a form of disaster recovery and a matter of routine drive installation. If you are an intensive, 16-hour day, seven-day week Mac user, then you should consider doing it more often. If you own and regularly use a dust cover on your Mac, you may never need to do it. You simply aren't pushing your machine hard enough to make the extra effort worthwhile.

**Basic Toolkit**

Here are some things you might want in your basic Mac toolkit. They are divided into three categories: the free, the nearly free, and those that are worth the cost. See the attached sidebar for information on contacting specific manufacturers or tracking down shareware.

In addition to using the tools below, you will want some way to boot your Mac other than with your regular System Folder. The most common method is with either a bootable System CD like the Mac OS 8 disk or with the Disk Tools diskette. Disk Tools contains Disk First Aid and a few other utilities. You can boot from this disk to clean up things on your main hard drive. Commercial programs such as Norton Utilities
also let you create a boot disk for use in emergencies. You'll see more about this under Chapter 14—Disaster Recovery. In a pinch a second partition on the hard drive can be used to boot from. See Chapter 15 for more information on partitioning your hard drive.

Finding this chapter's tools and utilities shouldn't be terribly hard. In addition to checking out the manufacturers' websites, you should be able to find most of the shareware at any of the Mac-shareware resources in Chapter 23. Don't forget to check the catalogs as well. You can find every item under the Worth the Cost section in any of these.

Stuffit Expander: www.aladdinsys.com (408-761-6200)
Dropstuff: www.aladdinsys.com (408-761-6200)
FWB Hard Disk Toolkit: www.fwb.com (415-325-4392)
Speed Doubler 2: www.connectix.com (415-571-5100)
Norton Utilities: www.symantec.com (800-441-7234)
Retrospect: www.dantz.com (510-253-3000)
SAM: www.symantec.com (800-441-7234)
Spring Cleaning: www.aladdinsys.com (408-761-6200)
Virex: www.datawatch.com (508-988-9700)

Free Tools

Some of the best tools for your Mac are absolutely free to individuals. In some cases the software is free altogether; in others, there's a charge only if the tool is used commercially.

Apple Disk Utility: This lets you initialize, partition, or update any
Apple hard drive you might be using. It is a must for anyone upgrading the System or adding a new Apple drive.

**Disinfectant:** Get Disinfectant! For a free utility, this is the hardest-working program in the Mac universe. Keep a copy handy, or use it daily if that will calm your virus-frightened soul.

**DiskCopy:** Included on every Mac System CD including Mac OS 8. DiskCopy can make duplicates of the same disk over and over and over. Use it to back up installer disks, or even make a digital business card on floppy to spread far and wide!

**ShrinkWrap:** Free to noncommercial users and educators, ShrinkWrap lets you make disk images and mount them quickly. You can even create a RAM disk or mount an entire 12-disk installer. Your RAM is the only limit.

**Stuffit Expander:** Aladdin Systems is the compression king of the Mac platform. Stuffit Expander is Aladdin’s way of keeping that crown. Stuffit Expander and Dropstuff (below) together will allow you to open anything.

**TechTool:** This amazing free tool from MicroMat lets you zap the PRAM, rebuild the desktop, profile your System, and even tells you your Mac’s birthday! For a small fee, you can personalize TechTool as a business card to give to clients. Talk about a hard-working program!

**Nearly Free Tools**

For the few dollars these tools cost, they should be on everyone’s Mac. Make sure they are part of your basic toolkit as well.

**Bombshelter:** This shareware addition claims to protect from some System crashes and disasters. Your mileage may vary. Even if it worked once, it might be worth getting.

**Dropstuff:** For $30 this Aladdin Systems product borders on falling
into the Worth the Cost section below. For your money, you get the ability to stuff, encrypt, and make self-extracting archives. You also enhance the performance of Stuffit Expander (above), allowing you to open almost anything on the planet.

**PowerPCheck:** For $5 PowerPCheck gives you the ability to see if that application or utility is PowerPC native or not. If you like, you can have it suck that offending 680x0 code out of your applications leaving you pure native applications and saving tons of space.

**Worth the Cost**

These programs cost real dollars, and they are generally worth the money. You can find shareware or freeware alternatives to most of these tools, but you get added value, not to mention peace of mind, with the professional product.

**FWB Hard Disk Toolkit:** For $70 individually or around $100 in a bundle with their other ToolKit products, Hard Disk ToolKit will let you format, partition, and maintain third-party drives. You also get other SCSI and drive tools to make your life easier.

**Speed Doubler 2:** You can think of Speed Doubler from Connectix as the 680x0 emulator Apple should have written. Even the enhanced emulator in the new Power Macs from Apple only matches Speed Doubler's speed. If you are running several older applications from the 680x0 days, then this is a bargain at around $55.

**Norton Utilities:** This is the ultimate Mac maintenance tool. At around $100 you'd expect a lot from Symantec's Norton Utilities, and you get it. You can build an emergency boot disk, defragment your hard drive, and recover lost files, among other things.

**Retrospect:** From Dantz Development Corporation, Retrospect is bundled with just about every archival drive on the market. It is the stan-
dard by which other Mac backup tools get measured. You can purchase a copy for about $150.

**SAM:** Symantec Antivirus for Macintosh is one of the platform mainstays for protection from the stray bug. It does everything you would expect from hunting down viruses to keeping them out of your downloaded files. Expect to pay about $70.

**Spring Cleaning:** Aladdin (Stuffit and Dropstuff above) has done it again with Spring Cleaning. This program will help you clean up everything. From its own FAT stripper for shrinking your applications to an orphan adopter to straighten out lost files, Spring Cleaning will slim down your System for around $50.

**Virex:** Datawatch's Virex lets you do drag-and-drop virus checks on single files or an entire drive. You can also keep an eye on those pesky downloads as well. It will set you back about $70.
DISASTER RECOVERY

Despite your best intentions, perilous forces from theft, mechanical failure, even gravity itself conspire against your precious Macintosh. If you want to prevent the mechanical or software problems, then look to Chapter 13 for information on preventive maintenance. To track down basic problems, you will want to see Chapter 6 – Troubleshooting. In this chapter, we will look at what to do once disaster is confirmed.

The disasters below usually mean the end of your Mac or some component of it. The luckiest disasters, if there is such a thing, are software or drive failures. As you'll see, they are easily corrected. Hardware problems, theft, and falls generally destroy the Mac itself, but some data may still be recovered. In any case, having a good backup is important. The final solution to most drive crashes will be to format your drive. As discussed in Chapter 12, formatting prepares the drive to receive data and will most likely erase any information you had on it.

What Is a Disaster?

What constitutes a disaster? For our purposes it is anything that renders your Mac unusable. As you'll see, there are varying states of unusable. For each there is usually a way to recover or repair the damage. In the worst cases, there may still be some way to have your data retrieved. In any case you should have a good backup of your data. Backups are
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discussed in detail in Chapter 13 – Preventive Maintenance, and they are the most important thing you can do for yourself regardless of the disaster. Of course this warning always seems to fall on deaf ears until it is too late. Most Mac users see real disasters so seldom that it is hard to estimate the danger. If you just use your Mac to surf, play, and write the occasional letter, then you may never really need to back up your data at all.

Backups are simply copies of the information on your Mac. You can save just the documents that are important to you or you can back up the entire drive. You can even automate the process with a product such as Retrospect from Dantz. Usually you will want to keep one copy of very important information off site to protect against fire, flood, and other natural disasters. However you choose to do it, safe backups are your best defense against any disaster.

The Mostly Unrecoverable

We’ll look at the worst disasters first. There is probably very little you can do to help in these cases, though we’ll discuss some basic precautions and actions. This should make the other disasters in this chapter seem mild in comparison. That’s small consolation if you just dropped your PowerBook into the Panama Canal. Dropped, crushed, and burned Macs make the worst subjects for recovery. About the best you can hope for in these cases is a recent backup and good insurance coverage. There is a small chance that some information may survive on your hard drive or disks. If you have something really important, there are several data-recovery companies that can make a stab at retrieving that information for you at a price.

First, the basic safety precautions. In addition to frequent backups as discussed above, you will want to talk to your insurance agent about your computer equipment. A single machine is probably safe under your homeowners policy, but if you rent or if you own more than $5,000 worth of computer equipment, you may need more coverage. Look into it. In today’s digital world there are many people with more money tied
up in their hardware than in their car, and other possessions.

Next, take the obvious precautions when using your Mac. This is doubly true of the temptingly portable PowerBook. Maybe the end of a pier with your feet dangling over the ocean isn’t the best place to pull out your PowerBook, no matter how inspiring it seems. The same goes for mountaintops, boats, and the Grand Canyon. A computer dropped from one of these is likely gone for good. If you are able to recover it, there are a few things you can do to try to save the data.

First, try to keep the drive intact and in a stable condition. Those drive cases are nearly indestructible, but they can be cracked or damaged. If you dropped your PowerBook from a moving car, for instance, it is very likely that the fall would total your computer but leave the drive intact. Scoop up the remains and remove the battery so that you don’t short anything else out. We discuss retrieving data in a moment. You’ll want to inspect the drive carefully at that time.

If you drop a computer into water or suffer a flood, you will want to retrieve it as quickly as possible. Don’t risk your own life by any means. If you can get it back quickly, then dismantle as much of it as you can and let it dry completely before turning it back on. In the case of saltwater submersion, you may even consider rinsing it thoroughly in fresh water with the battery removed. This cleans out the corrosive salts and dissolved metals and minerals in the seawater. NEVER POWER IT UP WET!

If the computer has been to a depth greater than 50 feet or submerged for more than a few hours, then you may want to leave it under water until you contact one of the recovery specialists listed at the end of this chapter. They may have special recommendations.

Theft

There is very little you can do about the theft of your computer after the fact. Like the disasters above, your best work is done in advance.
Make sure you have enough insurance and back up your Mac. This way you can at least replace it. You can also take precautions to reduce the chance that your Mac will be stolen. These options are discussed below. Finally, you may be able to see to it that your Mac finds its way back to you if it is lost or stolen. You can stack the deck in your favor with a few simple steps.

First, don't flash your hardware around. Inviting the entire dorm or apartment building over to see your new 350 MHz marvel may be fun, but it could make you a mark for an attempted theft later. Secondly, the Apple PowerBook used to be the number-one target of thieves in airports. Today that dubious honor is shared with all portable computers. When traveling keep your portable close at hand. Do not set it down while you talk on the phone or stand at the ticket counter. If you must set it down to free your hands, loop a strap around your leg so you can hold onto it.

Airport security checkpoints are another favorite target for thieves. The routing goes something like this. One thief waits at the end of the X-ray machine to snatch your Mac while another tries to walk through the metal detector with an iron skillet, 12 soda cans, and a pocket full of buckshot or something similar. While this accomplice makes a scene and slows you down, the first thief makes off with your PowerBook. Ask the security guard to hold on to your Mac if it must be X-rayed until you are at the end of the conveyor belt. Most airports will inspect your Mac by hand if you ask.

When traveling through airports, security will slow you down even more if you have a computer. Some checkpoints will ask that you boot your computer to prove it works. The components inside your PowerBook case look enough like a bomb to warrant the extra trouble. To get through these checkpoints quickly, start your Mac before you begin traveling and then put it to sleep. You can wake it with a single key click and get moving again quickly. If you don't have your power cables and batteries with you, the security guard may just decide to dismantle your Mac!
With desktop Macs and PowerBooks alike, there is a whole class of security locks and chains to help you out. If you look on the back of your Mac, you may see a small rectangular hole with a tiny padlock icon above it. This is the locking port and several different products will plug into it. Be sure to look for these products in the catalogs discussed in Chapter 28 or at your local retailer.

Tag and label your computer so it can be identified later. You can find several kits that include ultraviolet markers and paints that criminals won’t be able to remove. Another trick is to etch contact information into the inside of your case. It is unlikely that the person who stole your Mac will think of removing the case to file the ID off. Likewise, you can put your name and address on files inside the Mac as well. For example, it isn’t hard to use a paint program to create a startup screen or background pattern that includes your name, address, and phone number. If your Mac is recovered, the police will try to contact the owners, so any of these solutions could help your Mac find its way home.

In the near future a new class of programs may give your Mac the ability to call for help. Programs already exist for the PC platform that send a call for help over the phone line or over the Internet if the computer is stolen. This high-tech solution could be the forerunner of even more complex theft-recovery methods including wireless pager networks and global-positioning systems (GPS). Keep your ears open.

Hardware

Hardware has a lifespan. It will eventually fail no matter how well you take care of it. Apple measures this failure rate for every component as MTBF, or mean time between failures. Apple determines these limits by testing the limits of their hardware. Computerized pneumatic typists bang away on keyboards at more than 200 words per minute, other machines take mice out for two-day test drives and bake monitors and motherboards at almost 200 degrees. Another machine does nothing but shake Macs for 10 minutes straight in three sessions on each axis. Apple
then fixes anything that shows signs of weakness before the product is delivered to consumers. The bottom line is that Apple builds the Mac as well as it can be made, but eventually it will break.

Some hardware problems are easy to fix. A dead battery inside your Mac can be replaced for a small fee (usually around $25) by any service center. These lithium batteries have a five- to seven-year lifespan, so this is one hardware problem every Mac owner will face. The sure sign that your backup battery has gone is a forgetful Mac. If your machine suddenly decides it is 1909 and forgets the time when you shut it down, it is this battery for sure.

Interestingly, different Macs would default to different dates. Some Macs would think it was 1909 if they lost they battery; others would default to 1957. On the other side of the street, PC users would be surprised at that 1909 date. Their machines usually fall back to 1980. There's good news going the other way. Virtually every Mac around can handle dates to 2019 at the operating system level. Newer versions of the Date and Time control panel extend that. On the PC side, new boxes can handle dates well into the 2000s at the operating system level. Older PCs may fail the year 2,000 test. For either platform, the operating system can be patched to handle dates beyond 2,000 easily. The real problem will be some older application software. But that's another story.

There are several errors that indicate specific hardware problems. To fix these problems you will need to take your Mac to the local shop where the defective part or board will be replaced.

When you start your Mac and hear those terrifying chimes of death, then you'll know that something is wrong. Your Mac will then give you an error code to tell you what hardware or software caused the problem. Some of these codes are listed in Chapter 4 under the section on Startup. For more information on these, see Apple's Technical Information Library at til.info.apple.com. You will want to search for Sad
Mac error codes. You will probably get much more detail than you need. Generally, though, the code will probably tell you which part you will be paying to have replaced at your local Mac shop. Luckily, disasters this bad are rare.

Software

Another disaster lurks in software corruption. Sometimes applications get damaged because of a problem with your drive. Other times they get overwritten or damaged by viruses or other errors. When this happens, they usually just quit working. If the software that quits on you is your Finder or System software, then there is nothing to do but reinstall. See Chapter 13 – Preventive Maintenance for tips on preventing this sort of corruption.

Luckily, as disasters go, a software-based one is pretty tame. Although your Mac will start up with the flashing question mark that means it can’t find a System Folder, you can still startup from a system CD like the one shown in Figure 14-1. More important still, your data should be unharmed. Once you reinstall the system software everything should be back to normal. Of course if the corruption was caused by a
disk problem in the first place, you still need to fix that before it becomes an even bigger problem. Again, see Chapter 13.

Drives

Your hard drive can die for a number of reasons. Again, there is the ever-present effect of entropy. Things break. In addition to mechanical problems, software problems can plague your drives as well. There are a couple of key predators.

First, improperly upgrading or formatting your drive can cause problems. If you have an older copy of Apple's Drive Setup or FWB's Hard Drive ToolKit, it may not have the latest drivers to format your hard disk properly. If you have a drive newer than the software you are using to format it, errors can occur that could cause flaky performance and eventually a crash. The problem is you might not know for weeks or months that there is a problem. Make sure to check for the very latest updates for any drive-formatting utility before using it on a new drive. Whatever shipped with your drive should work just fine with it.

Apple's latest Drive Setup can usually be found on your System CD-ROM like this one for Mac OS 8 shown in Figure 14-2. FWB's products are commercial but may come bundled with different third-party drives. When working with internal Apple drives, you'll generally want to stick with Apple's utility. Formatting an internal apple drive with FWB's Hard Disk ToolKit may result in a drive that can only be modified with FWB's tools and is no longer recognized by Apple's Disk First Aid and Drive Setup. Look to their respective Websites for updates.

Secondly, improperly repairing your drive or installing system software without updating your drivers could produce errors. From time to time Apple and other drive manufacturers release updated software for the drives they use and
manufacture. The ones from Apple are especially important when you upgrade your System. Apple recommends you update them as part of the installation procedure for Mac OS 8. You will find the Update Driver option under the Functions menu in Drive Setup after you select an Apple hard drive, as shown in Figure 14-3. Selecting it writes the new driver to disk (see Figure 14-4) but you must restart before it takes effect.

![Figure 14-3: Update Driver Function](image1)

![Figure 14-4: Disk Choice](image2)
A new drive like this can cause problems if utilities such as Norton recognize the changes as errors and try to fix them. It is a little like the Dr. Seuss book with the Sneeches running amok trying to overwrite each other's stars. Disk Doctor can actually hurt the situation if you don't have the latest copy. Eventually, the result is a crashed or flaky disk. Make sure you upgrade to the latest version of utilities such as these when you update your drivers and system software.

For any of these problems, you may be able to repair the problem if you catch it soon enough. A crashed disk can sometimes be repaired and resurrected by Disk First Aid or Norton Disk Doctor, shown in Figure 14-5. Try them first. If they work, back up and archive as much as you can and consider reformattting the drive. Sometimes, the disk won't come up at all and the only solution is to reformat your entire drive.

Be Prepared

Like any good mechanic, you need good tools. You've already seen most of these tools in previous chapters, but we'll mention them one more time here. You will also need to know a few simple skills to resurrect your drive and retrieve data.
Basic Tools

Most of your basic toolkit has already been discussed in Chapter 13. See that chapter's Basic Toolkit section for more information on individual utilities mentioned here and contacting their manufacturers. You need tools to repair and reformat your drive, System disks to reinstall and boot from in emergencies when your primary drive has crashed, and a data recovery tool. FWB, Symantec, and Apple make all of the basic tools you'll need.

First, if you haven't bought Mac OS 8 and you have a 68040 or PowerPC-based Mac, buy it. You'll get most of the disaster-recovery tools you need along with the latest and greatest Mac OS. If you have a CD-ROM drive, you can use the Mac OS 8 CD as a boot disk. There are also disks for booting 68040 and Power Macs if you don't have a CD-ROM. That gives you your first tool, a startup disk. If you are using older system software, then you may be able to boot from that disk as well. The System 7.6 CD-ROM is bootable across every Mac. Other system CDs may or may not boot your individual machine. If the disk or CD came with your Mac, it should work in an emergency. Norton Utilities can also create an emergency tools disk for you.

The next toolkit item you will find on your Mac OS 8 CD is Drive Setup, which we've already mentioned. You can use this utility to format, partition, and update any Apple drive. These are generally the internal drives that came with your Macintosh. If you have a third-party drive or a Mac clone, then you may need FWB's Hard Drive Toolkit instead. It performs basically the same function. The last resort of any disk-based disaster is reformatting and both of these utilities will handle that for you.

Finally, you have a disk-repair tool on your Mac OS 8 CD-ROM. You need a tool to repair your drive if it has suffered damage. We are talking about the virtual, digital life of your drive involving the files, drivers, and data on the drive itself. If something goes wrong out here in the gross
physical world such as a blown SCSI controller, bad cable, or shot drive motor, then no amount of software tweaking will fix it. Apple's Disk First Aid, shown in Figure 14-6, will fix any Apple drive. You may also want to use Norton Utilities, shown in Figure 14-7.

![Figure 14-6: Apple's Disk First Aid](image)

![Figure 14-7: Norton Utilities](image)
Basic Skills

In addition to having the tools mentioned above, it pays to know just a few skills. First, make sure you know how to back up your data and retrieve it when you need it. A tool such as Dantz Retrospect may help, but you could also use floppies and patience if your needs are small. You also want to feel comfortable with your disk tools. Try running Disk First Aid or Norton while things are OK to get the hang of them. The last thing you need in the midst of a disaster is new-user jitters because of unfamiliar software.

If you need to fiddle with hardware, then you will need to know how to open your case, ground yourself, and get around inside your machine. Since this is a rarity in the Mac world, we have covered very little inside the case beyond the installation of cards and RAM. Get familiar with removing your specific Mac's case and read on.

Briefly, always shut down and leave your Mac off. You may choose to leave it plugged in, though. This grounds the machine and reduces the chance of damage from static discharge. When you open the case, touch the power supply case to ground yourself. This makes sure you and the Mac have the same electrical charge and lessens the chance of your zapping anything vital. You may even have a wrist strap grounding cable that clips to the power supply or plugs into the Mac. If you do, use it, but in all cases use care when you are working on an open Mac case. Remember there is voltage inside that power supply if you left it plugged in, enough voltage to give you a nasty shock if you fail to respect it.

Avoid jerking or forcing anything inside your machine. If firm, steady pressure fails to remove a SCSI cable or seat a card, then check everything and try again. Your SCSI cables, for example, have a notch and groove that lets them plug in only one way.
CHAPTER 14: DISASTER RECOVERY

Retrieving Data

There are basically three ways you can retrieve data from a dead Mac hard drive. First, there are software methods using various disk tools. Second, you can physically move a drive from a head case or machine to another one. Finally, you can contact one of several professional recovery specialists.

Disk tools method

You can do several things with software that we have already discussed.

First, as mentioned in Chapter 12, you can use tools such as SCSI Probe or the mounter in FWB’s Hard Drive ToolKit to try to remount the dead drive. This will sometimes work by itself. You can try repairing a drive that won’t mount with Disk First Aid or Norton Utilities. To use Disk First Aid, first double-click its icon to launch it and select the drive you want from the screen shown in Figure 14-8. Select the drive you want to repair and click the Repair button. If you can’t fix the drive for some reason you will usually be told why with a message such as the one in Figure 14-9.

![Figure 14-8: Select Drive In Disk First Aid](image)
Some of the volumes you selected can't be repaired. You cannot repair the startup disk, the Disk First Aid disk, a write protected disk, a disk with open files, or any disk when File Sharing is active.

You may still verify these disks.

Figure 14-9: Disk First Aid Warning

To repair a disk with Norton Utilities, first launch Norton by double-clicking its icon shown in Figure 14-10. Select Norton Disk Doctor from the window shown in Figure 14-11. You will be instructed to select the faulty disk and click Examine as shown in Figure 14-12. The little disk doctor in the upper left of the window gets busy looking over your disk as shown in
Figure 14-13: Norton Utilities Disk Doctor

Figure 14-13. Finally, you are given a report on what was found. In some cases, this alone may fix a disk problem.

You can also UnErase from the Norton Utilities main menu to try to resurrect individual files. After you click on the main menu's UnErase button, you start the process by selecting your drive and clicking the Search button shown in Figure 14-14. Norton will generate a list of the files it could find and show you a probability of recovering them. If your drive won't appear in any of these programs, then you have more serious problems. Double-check your connections to the drive one more time and consider resorting to the final data-recovery step below.
CHAPTER 14: DISASTER RECOVERY

Hardware Method

If the Mac itself is dead either because it got dropped, smashed, burned, melted, or otherwise incapacitated, the drive itself may be good. You might try swapping it with the drive from another Mac or plugging it into a spare case if you have one. You can try all of the above software tools on it if that works. If you are really lucky, the drive may just mount in its new home and you can salvage your files by simply copying them.

Outside Assistance

If nothing else has worked, then you may need to resort to help from a recovery expert. You'll find their ads in several magazines such as the ones from MacWEEK shown Figure 14-15.

![Typical Disk Repair Ads](image)

*Figure 14-15: Typical Disk Repair Ads*
CHAPTER 14: DISASTER RECOVERY

Here are four, and you may want to search on the Internet or browse through the classified sections of a few computer magazines to find more.

DriveSavers: 415-382-2000 - www.drivesavers.com
Ontrack Data Recovery: 800-872-2599 - www.ontrack.com
Total Recall: 800-743-0594 - www.recallusa.com

When you call they will tell you what you need to do. Many offer 24-hour or faster service. They can back up your data to tape or any media you provide. These services can be very pricey, but in some cases there may be no alternative. In a world where our bits of data are becoming more and more valuable, it is nice to know this safety net is there.

Reformatting and Rebuilding

After you have retrieved what you can from your drive, it is time to reformat it and start over. You will need to prepare the drive for use with your computer and then reinstall all of the software you need to use. There are a couple of exceptions to the procedure though. First, if there are hardware problems with the drive, then you should probably toss it. A mechanically damaged drive will likely fail again, and some problems could damage your Mac as well. Second, if you have experienced repeated problems with a drive, then every reformat could bring you closer to disaster. If you have had the drive for three or more years, then you can likely replace it for a fraction of its original cost. If neither of these situations exist, then reformat at will.
Disk formatters and Tools

Formatting a drive is also called *initializing* the disk. Either way you say it, you are preparing the disk to receive data. This process is discussed in detail in Chapter 12 – Drives and SCSI Voodoo. When you launch your formatting tool of choice you will be asked to select a drive to initialize as shown in Figure 14-16. During the process with any formatter, you will be asked to determine variables similar to the ones shown in Figure 14-17. These screens are from Apple’s Drive Setup but are similar for other tools as well. You can break your drive up into *partitions*, or smaller chunks of the same drive. This can be useful for several reasons, from organizing your data to optimizing your disk usage. Initializing a drive only deletes the disk’s directory information and actually leaves the data untouched. Although you can’t see it, the information is still there and can be found with some disk-recovery tools. If you are offered the option of a low-level format or Write Data to 0, then selecting it guarantees that any information on the drive is erased. This could be important if you have security concerns. Again, this and other formatting details are discussed at length in Chapter 12.

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*Figure 14-16: Drive Format Selection*
Rebuilding Your Mac

When you actually start rebuilding your Mac from the ground up with a low-level format, take it as an opportunity to rebuild your entire drive. Make a list of the tools and utilities you will need and have those installers handy. On a larger drive, the formatting can take many minutes to hours, so be prepared for a wait. After you have formatted the drive, then installing Mac OS 8 takes only minutes. After that, you can restart and reinstall your software and restore your data from backups. Install just the important stuff and save yourself some clutter. You will probably be surprised at how much stuff you can actually live without. Now is the time to update and upgrade your software as well. Use this as an opportunity to scour the Internet for updates to your software, or buy the latest versions if you have been considering an upgrade. As discussed in Chapter 13, whenever you reformat a drive, use the opportunity to streamline as much of your Mac as possible.
adding drives & devices

HERE'S A CHAPTER THAT YOU'LL FIND USEFUL AS YOU LEARN about your Mac, but it won't be terribly deep, because it doesn't need to be. It's not that there aren't a lot of neat tools and toys you can plug into your Mac, it's just that installing them isn't the same challenge it is for most Windows users. It is easy and downright boring. Once the basics have been described, you will find them the same for almost every device. You just install any required drivers and plug in your gizmo of choice. That's about it. SCSI devices are the most complex. As you learned in Chapter 12, you must deal with SCSI IDs for each device. If that is at all confusing, make sure to reread Chapter 12 before installing anything SCSI. We'll look at the different toys you can add in this chapter.

Basically, there are distinct device classes for each port on the back of your Mac. The ADB port will be used for input devices. The serial port is for communications devices, from modems to the U.S. Robotics Palm Pilot. You will print to most devices through the serial port as well. Your SCSI port is generally for drives, scanners, and the occasional printer. Of course, what would a set of guidelines like these be without exceptions? There are printers that plug into SCSI ports, communications devices that you network through Ethernet, and other exceptions to these guidelines. We'll look at some of the possibilities gizmo-by-gizmo, thingy-by-thingy. (We Mac users are a highly technical lot, no?)
ADB Thingys

The ADB port, also known as the Apple Desktop Bus, is labeled with this icon: 😎. Like the SCSI port, it is designed to support a chain of devices. You can plug items into one another in long strings. You can have up to 16 devices on an ADB port, but some Macs have two ports, so you can add up to 32 keyboards, trackballs, joysticks, and mice to those models. The ADB port’s sole purpose in life is to listen to you through a variety of input devices, so you can expect about any kind of controller you buy to plug in here. Additionally, this port is powered and devices from Ethernet adapters to night lights take advantage of that fact. You can plug them into the ADB chain and save yourself the trouble of lugging around an extra battery or power supply.

Since this port is powered, if you swap devices while the Mac is on, you can damage items you plug and unplug here. You could even toast the ADB controller in the Mac itself. Now, we haven’t actually seen that happen, but it is a possibility, so why take chances? The problem comes when you cause pins to come into contact improperly as you fiddle with the ADB connector. One wrong surge and... poof. Also, your Mac tends to forget things like the mouse speed settings if you unplug it in the middle of a session. Shut down first and then rearrange the ADB chain at will before you restart.

Keyboards

OK, keyboards are the most common items in your ADB chain. Some people may use a trackpad or trackball instead of a mouse, but everybody uses the same old keyboard, right? Well, not exactly. You can use one of several keyboards available in the market today. Each keyboard design may sport slightly different features, but electronically they are basically the same. There are so-called QWERTY keyboards that take their name from the first six alphabet letters in the top-left corner of a
standard typewriter layout. Go ahead, look for yourself. These will generally be found in the 81-key standard and 104-key extended configurations. You can also find ergonomically designed keyboards, kid's keyboards, and specialty keyboards of all sorts.

Other keyboards have been created. There are keyboards localized to the countries in which they are sold, and with the Macintosh computer experiencing strong worldwide sales, these keyboards can be quite common. There are also alternative layouts designed to increase your speed as a typist. Basically, any ADB keyboard will work with your Mac. To use any keyboard, simply plug it in. That's it. If you are using a specialty keyboard of some sort, you may need to install a special set of keyboard settings with a standard installer, after which you can select the keyboard from the Keyboards control panel shown in Figure 15-1. Another neat trick is dual control. If you add a second keyboard, then the Mac will recognize both. This helps out with cooperative projects and games, giving each worker, or player, a set of keys.

Figure 15-1: Keyboard Control Panel
Mice, Trackballs, and Trackpads

The standard mouse shown in Figure 15-2 has gone through quite an evolution from the chunky beast it once was. You use the mouse to move your on-screen pointer and click your way around the Mac. That isn't your only option, though. Two of the most popular alternatives are trackballs and trackpads. In addition, you can get two- and three-button or even cordless mice. Mice such as these usually come with additional software that lets you create special functions for the extra buttons. So in addition to plugging in a new mouse of this type, you also would have to install some software to get full functionality out of it. The trackball is just an upside-down mouse. Instead of rolling a ball on your mouse pad, you roll the ball with your palm or fingertips. Usually a trackball sports more than one button, as well. It is a nice alternative to your mouse and does offer two buttons that you can enhance with special functionality using the included software.

Trackpads work by sensing where your finger is on a pressure-sensitive surface. You'll find them in most PowerBooks, but smaller add-on trackpads for your desktop systems are available. They are closely related to the drawing tablets discussed next. In any case, you just plug them in and they work. The only other software you might have to add would be for a multibutton or programmable mouse capable of stringing
powerful macros together. Otherwise, all you do with a Mac mouse is plug it in.

As you look around for alternative input devices, you’ll come across some hybrid hardware. Logitec, for example, markets the Trackman Marble, a Mac-compatible trackball that’s housed in a mouselike case that actually somewhat resembles a foot with a bunion. It can even be programmed as well. You’ll need to install a custom driver for this device, but once you have everything working, you can assign functions to the various buttons. Logitec says the trackball marble on the side of the Trackman uses “MarbleTM sensing technology (that) eliminates the mechanical parts that record motion, enhancing precision, reducing wear and ensuring smooth tracking. Resistant to dust and dirt, TrackMan Marble doesn’t require regular cleaning.” Trackman, like an increasing number of products, is a cross-platform device that you can use virtually the same in Windows or Mac OS.

**Drawing Tablets**

Closely related to today’s trackpads is the drawing tablet. Tablets are found in many high-end graphics shops because they are easy for designers and artists to use. The tablets make use of fine motor skills that these professionals spend years developing. They have a flat tablet that is pressure sensitive and a *stylus* that is something like a pen or pencil. In original tablet designs these styli are dumb, with no special abilities. Newer designs often contain their own brains and abilities. Wacom makes several tablets that include pressure-sensitive styli. Some will even erase if you flip them over and use the other end! Let’s face it, we’ve been doing that since grade school. It is easier and more familiar. The current hot ticket in the tablet world is the Wacom PL-300, which features its own built-in LCD display.

You usually need to install drivers for the tablet’s special functions before you plug it in. This will be a straightforward installer in most cases. After you plug it in and restart, the stylus can replace your mouse and gives you added features in most graphic and layout programs. You
can also lay out special buttons and macros right on the tablet itself. Many of these offer a clear plastic cover of some sort under which you can slide a template of often-used commands and functions. After you program them into the tablet's software or load them from a template, you can have needed tools and utilities a stylus tap away. For example, you can program a tiny pallet of Photoshop tools into a tablet and then just tap one to switch tools. This means there is no more opening or finding the right window on a cluttered screen.

### Joysticks and Gamepads

For games and game play, you probably want a joystick. They range from the simple to the intimidatingly complex. A popular Mac joystick is the MouseStick II from Gravis Systems (see Figure 15-3). It plugs into the ADB port and includes software that makes it compatible with about any Mac-based action game.

One thing most PC users notice about the Mac right off is the missing mouse button. In Windows, you right-click a lot. Right-clicking means you click with an extra mouse button. That's something most Mac users have never done. Mac users use keyboard shortcuts for most of the same functions that the right-click serves in the PC world. Additionally, Apple has added contextual menus to Mac OS 8 that are strikingly similar to Window's properties menus.

If you want to use that second button on a Mac, you can add a mouse or trackball with two or more buttons. Generally, these extra buttons are programmable with software that ships with the mouse or trackball. You can decide what you want them to do. Macally makes a good two-button mouse, shown in Figure 15-4, that retails for around $50. In the final analysis, the difference between the two platforms in this case is close to the difference between using a car with automatic transmission instead of a stick shift. Most Mac users never miss the extra button.
The MouseStick II is a midrange joystick. Gravis offers other models with some game-specific features. Check out the Blackhawk (Figure 15-4) and the Firebird 2 (Figure 15-5). These joysticks offer enhanced features such as programmable buttons and preprogrammed special functions for popular games.

You can find joysticks with a lot more controls and features. On one trip we counted more than 100 possible controls on a joystick in a local
computer store. With the software that ships with most joysticks, you can program these functions for your favorite games. Since the stick can control your pointer, you could theoretically use it as 37-button mouse! Most sticks ship with presets for popular games. Taking it a step further, you can buy specialized driving and flying controls complete with pedals, rudder control, and other high-tech features. Again, like other ADB devices, they just plug in. Extra software lets you program and modify them to your specific games.

In addition to lots of buttons and special features and functions, joysticks come with wires or without. The wireless models use infrared communications to free you from the Mac tether. You'll still have to plug a transceiver into your serial or ADB port to handle the communication. And most joystick devices will require you to install software drivers for proper operation.

For the directionally challenged, look for joysticks that can be programmed for left- or right-hand operation. Not all products are so well-designed, but some of them are. If you've tried a joystick that assumes you use your right hand for directional control, you'll appreciate a product that lets you have it your way.

If the game's the thing for you, consider a Gamepad such as the one shown in Figure 15-6. For hands-on gaming, a pad such as this one from Gravis gives you control similar to a joystick, plus a multidirectional
control pad. These, too, usually sport programmable keys so you can get special functionality from the buttons, and they may include custom-control settings for popular games.

**Other**

Finally, there are all sorts of sneaky devices and cool tools for your ADB port. You can get SCSI-based Ethernet adapters for your PowerBook that use the ADB port for power. You can even get a reading light from Mac Components Engineered. The ADB Flexlight shown in Figure 15-7 lets you get the light you need to do what you need to do.

![Figure 15-7: MCE FlexLight](image)

**Printer and Modem Port Doohickeys**

Your printer and modem ports are called *serial ports*, and they are used for communications. This can be as simple as sending information to the printer, receiving information from a camera, or handling LocalTalk networking. These tend to be the most overworked and overused ports on your Mac. Even with two of them, you may find yourself running short on occasion. Luckily there are several devices made to handle communications with your various toys. These can either add more ports to your
Mac or juggle devices on the existing ports. Installation will vary in complexity depending on the device. Expect to load at least some software in addition to plugging in the device. Unlike SCSI or ADB, serial ports won’t let you daisy-chain devices together. Each port supports only one item.

Printers

Historically the printer has been the most common and available Mac device. You had a port with a little picture of a printer above it, so you just had to have a printer, right? Today some printers use the Mac's built-in Ethernet port instead. Others use the printer port but as a LocalTalk port, not a direct printer connection. For most of your ink-jet or older printers, the standard connection is still a printer cable between your printer and this port. When installing a printer, you will run an installer that came with your printer and plug it in. If it is an Apple printer, then there is a good chance that you have already installed the proper driver in your Chooser as shown in Figure 15-8. After everything is installed and plugged in, just open the Chooser.
under your Apple Menu and select the appropriate printer. You will be asked which port you're using, as shown in Figure 15-9. Note that you can use the modem or printer port. To use the printer port, you will have to turn off AppleTalk if you have been connected to a network through LocalTalk. This isn't true if you are on an Ethernet since that doesn't use this port.

![Chooser With Port Choice](image)

**Figure 15-9: Chooser With Port Choice**

**Modems**

Modems are the must-have item of the '90s. A computer without one is considered half a machine as everyone scrambles onto the Internet. In most cases, you just plug the modem in and then select it from the specific application that you plan to use with it. That is starting to change. Open Transport gives you a Modem control panel shown in Figure 15-10. As more developers take advantage of it, they should be able to ask your system software just where the modem is. Far and away the Internet is the biggest use for a modem. In this case you will be using
Open Transport to connect to the Internet through the modem and make the Internet available to other software. Although they use your modem, Web browsers such as Netscape and Internet Explorer don’t know which modem you use or where it is, nor do they care. They talk strictly with Open Transport. If you use a terminal program like the one in ClarisWorks, then you will need to select the appropriate settings from the appropriate menu. In this case, you will find the modem settings under the Settings menu in your ClarisWorks terminal program. You aren’t limited to the Modem port in any case and can use the printer port as well.

![Modem Control Panel](Figure 15-10: Modem Control Panel)

There is also another brand of serial port out there that you may have called a GeoPort or GeoPort-compatible serial port. The big difference is a single pin that lets your Mac provide power for whatever device takes advantage of it. Unfortunately there aren’t that many. You can use an Apple GeoPort adapter to act like a modem, and Apple’s Megaphone software will act like a speakerphone for you in a pinch. The trick that makes these devices work is actually software. Your Mac spends some of its time pretending to be a modem, speakerphone, or whatever. This slick integration of telephony and your computer is great when it works.
LocalTalk

You are already familiar with networking through your printer port from Chapter 9 - Networking. Any device you can talk to with a LocalTalk connection can be used in this port. That means you can string a pair of Macs or a Mac and a printer together with your basic printer cable. You also can connect to this port devices such as LocalTalk-to-Ethernet bridges and PhoneNET connections as well. See Chapter 9 for more details on these and other networking options.

Pilot, Newton, and Other PDAs

Another class of items that is becoming popular with Mac users everywhere is the PDA, or Personal Digital Assistant. These are smaller computers designed to be carried around in brief cases, school bags, and breast pockets. You are expected to use them for short note taking and phone numbers, but several products are pushing those boundaries. In addition to Apple's Newton and eMate, there is the incredibly popular and versatile U.S. Robotics Pilot, shown in Figure 15-11. You can use software you install on your Mac to keep both the PDA and desktop information in sync. You simply plug the Pilot into one of your serial ports and install the software. After that, you only have to push the sync button on your Pilot's dock to synchronize information between the two.

Another popular device that falls someplace between PDA and portable computer is the Apple eMate. The futuristic looking eMate was originally designed for the education market. It sports features such as ease of use, a large QWERTY keyboard (by PDA standards), and the ability to withstand a fall

Figure 15-11: U.S. Robotics Palm Pilot
from the height of your average fourth grader. Other features such as the built-in email and Web browser support plus a backlight and 24-hour battery life make this computer attractive to business people as well.

**Digital Cameras and the Connectix QuickCam**

The Apple QuickTake 200 shown in Figure 15-12 is typical of digital cameras today. There is no easier digital camera to use with your Mac. Just install the software and plug the cable into the camera and the serial port of your choice on the back of your Mac. You can connect to the attached camera and change which port you use from the QuickTake Image Access control panel in your Control Panels folder. The one shown in Figure 15-13 is from a QuickTake 150 camera.

Selecting Connect to Camera causes an icon of the camera to appear on the desktop. From there you can treat it like a tiny attached drive and drag items off of it to copy them. Your own experience will vary from camera to camera, but most cameras use this port. The Apple cameras have the added advantage of being Apple-Scriptable, which lets you control the attached camera from the desktop. Another good line of dig-

*Figure 15-12: Apple QuickTake 200*
Chapter 15: Adding Drives and Devices

Digital cameras come from Olympus, Kodak, Epson, Sony, and others. Top-of-the-line cameras cost more than $1,000, and there are more-affordable cameras at $450.

There is also a class of camera that uses your serial port exclusively. One of these is the Connectix QuickCam. This small eyeball-shaped device plugs into a serial port on your Mac and captures either black-and-white or color images. You can use one by running the installer software and plugging it in. Uses include capturing stills, video, and handling simple video conferencing.

For newer PowerBooks the iREZ corporation makes the powerful Kritter. Plugged into a 2400c or 3400c PowerBook, Kritter uses zoomed video technology to speed things up and bypass the system bus. This makes possible 640 x 480 pixel, 30-frame-per-second video captures.

Others

There are many, many other devices from compact document scanners to infrared transmitters that use your serial port. In fact, you could easily find yourself with two ports and four devices! Think about it. You've
got LocalTalk, a color printer, the Pilot, and a QuickTake 200. These devices tend to argue over whose turn it actually is to talk to the port. This leads to all sorts of conflicts with the installed software. There are a couple of ways to fix this problem, though.

Manufacturer Momentum has a pair of products that plug into your serial port and then double or quadruple the number of ports you can use. Port Doubler lets you add two ports for around $50 and Port Juggler gives you four ports for $125. You also install software that acts as a traffic cop inside your machine and gives access to these ports to programs that need it.

Sometimes, though, that port-doubling software just doesn’t cut it. You have to trust the software to switch things correctly and in a timely manner. Also, you are still using only one product at a time. If you wanted to turn a Mac into a dial-up server of some sort, then you need more real serial ports that can be connected at the same time. KeySpan’s SX cards add two or four more serial ports for $230 and $330, respectively. Each of these ports provides 230Kbps simultaneous access through your Mac’s PCI expansion slot. This means you have to install an expansion card, but as you saw in Chapter 11, that isn’t too difficult. Afterward, you have a rock-solid solution to your serious serial port scarcity.

**SCSI Gizmos**

Finally, let’s take a brief look at the SCSI port and the devices it supports. You have a set of rules to follow when adding devices to this SCSI chain. The details are covered in Chapter 12—Drives and SCSI VooDoo.

In general you need to terminate SCSI devices at the end of the chain. You do this with a *SCSI terminator* shown in Figure 15-14 or built-in termination that is part of the SCSI device itself. The back of your Zip drive has a tiny switch, shown in Figure 15-15, that turns termination on and off. This is also where you set its *SCSI ID*. 
Next, don't duplicate SCSI addresses. Each SCSI device gets its own SCSI ID number. You can't use the same number twice, and as a rule of thumb you will want to place higher-numbered devices closer to your Mac.

Finally, consider the length of your SCSI device chain. Yes, you can purchase a 10-foot SCSI cable, but the question is, why? There is more chance of interference and data loss the longer the cable is. For best performance and reliability, keep your SCSI chain as short as possible. Inspect or swap cables at the first sign of trouble. A $20 cable is cheaper than a $400 drive or having to replace valuable data.
CHAPTER 15: ADDING DRIVES AND DEVICES

Hard Drives

Most of the ads tout the ultra-low price of their *internal hard drives*. This means that to use one, you must have power and an available space on your SCSI cable inside your Mac's case. On the other hand, you can use an external case with a power supply and SCSI connectors, if you like. When you see higher prices for an *external configuration*, that is what you are buying. These cases will have two SCSI ports out the back and a small switch for selecting SCSI ID. You then add them to your Mac by plugging them in. Again, make sure the chain is terminated and you don't duplicate SCSI IDs.

If the drive hasn't been formatted, then you will need to do that before you can use it. This is also known as initializing your drive. You typically use a utility such as FWB's Hard Disk ToolKit shown in Figure 15-16. See chapter 12 for more on this and other SCSI-related skills.

Scanners

Scanners such as the one in Figure 15-17 plug into your SCSI chain in the same way that disk drives do. Many scanners want to be the last device in the chain and may feature internal termination and only one SCSI port to force you to place them there. This annoying little feature may be compounded by a limited number of available SCSI IDs for them. Most want to be SCSI ID 5 or 6.

*Figure 15-17: Scanner*
Installing scanners involves the extra step of installing them into your paint software as well. Most scanners ship with a smaller, simpler version of powerful commercial software such as Photoshop. This is intended to give you something you can use if you don’t have any software at all. Otherwise, you want to install the scanner software into your regular graphics tools such as Photoshop or Canvas. This is done with plug-ins in many cases.

Figure 15-18 shows you a scanner package installed in Adobe Photoshop. When you launch Photoshop, or any other paint tool, you will typically find these scanner controls in the Import option selection under the File menu, as shown in Figure 15-19. In this case, the proper selection launches Scan Wizard, shown in Figure 15-20, from which you control your scanner.
Chapter 15: Adding Drives and Devices

Figure 15-19: Scanner Import Option

Figure 15-20: Scan Wizard Controls
Scanners will usually come with a single simple software installer that puts everything where it needs to be for you. Then all you have to do is plug in and go. In the worst case, you will need to drag-and-drop the scanner plug-ins into the proper folder yourself. Most graphics software packages keep their plug-ins folder in the application folder alongside the application itself.

You may also need to install special software for OCR, or *optical character recognition*. You use OCR to scan text into your word-processing software. In many cases OCR software gets installed into the Chooser or alongside your word processor. Since the location varies from application to application, see the specific instructions for your installer.

**Removables**

The Zip disk, for example, has become a very popular and visible standard of the removable drive market. Its sister product Jaz is also very popular. These drives and other removables use a single SCSI ID and give you a virtually unlimited amount of storage. To install one, you simply plug it in.

There are a variety of other removable drives on the market including tapes, magneto optical, and recordable CD drives. They all use the SCSI chain to communicate to your Mac. Follow the specific instructions for your drive, but most likely, installation involves running a simple installer and then plugging in the drive. With CD-R drives you will need a special application to write to the CD. This process is sometimes called *burning* a CD-ROM. The most popular Mac software by far is Adaptec's Toast software. Generally, CD-R drives come bundled with Toast or another utility.

Another subclass of the removable drive is the tape drive. Used almost exclusively for backup and archival tasks, tape drives are often bundled with Dantz Retrospect mentioned elsewhere in this book. To install the drive, you simply plug it into your SCSI chain. To access a
tape drive, you must usually use Retrospect or a similar utility. With this software installed, you can backup your work on a single machine or across an entire network.

**Other Items . . .**

There are many other odds and ends that will plug into your SCSI port. One of the more unusual is a printer. The Apple Color Printer, LaserWriter SC, and LaserWriter II SC GX all had SCSI connectors. You occasionally will see this sort of thing in some high-end color printers. Other than the typical SCSI rules, installation is identical to that for any other printer. You simply load the proper driver with the included installer and you are off and printing.

Another gizmo of great utility is the Asanté Desktop EN/SC and similar devices. They plug into your SCSI port and provide Ethernet connectivity to slotless Macs that would otherwise go unconnected to the Ethernet network. In this case you will plug the Ethernet device in and then install the appropriate software drivers. From there it will behave as an installed network card. You can connect by selecting Ethernet from Open Transport or your Networking control panel in earlier System versions.
Finding This Chapter's Resources.

Adaptec: www.adaptec.com - 408 945-8600
Apple: www.apple.com - 408-996-1010
Connectix: www.connectix.com - 800-950-5880
Gravis: www.gravis.com - 604-431-5020
Iomega: www.iomega.com - 801-778-1000
Kensington: www.kensington.com - 650-572-2700
Logitech: www.logitech.com - 510-795-8500
Mac Components Engineered: www.powerbook1.com - 714-458-0800
Macally: www.macally.com - 626-338-8787
Syquest Technology: www.syquest.com - 510-226-4000
Wacom: www.wacom.com - 800-922-6613
word processing

FROM THE EARLIEST BEGINNINGS OF DESKTOP COMPUTING, word processing—the ability to enter text into an electronic format and manipulate it—has been among the most popular applications. The first text editing programs for microcomputers were fairly primitive, of course, but they solved the needs of the first users: programmers.

That's right. The first word processor users on microcomputers were the programmers who wrote the early programs. Some of these text manipulation packages were copied from mainframe programs, also designed to make it easier for programmers to enter the code for system compilers during application development.

From that beginning has evolved a range of word processing, text editing, page layout and design, graphics design, and so much more. If your first word processor was a modern, full-featured program, then you probably just accept the incredible functionality it includes as a matter of course. Those of us who used the first word processors are sometimes surprised (amazed, even!) with each new, multifeatured program release.

Whatever your computing background, if you have a Mac you're probably using it at least part of the time for text editing or word processing. If you're not now using word processing, you probably will. In this chapter we'll give you a little background on this crucial, fascinating computer application and point you toward some of the top Mac-based products in the marketplace today.
Text Editor or Word Processor

Already in this chapter we have used two terms to describe a word processor application: text editor and word processor. You may still hear these two terms used interchangeably, but in reality they are very different products, both with a useful place in your Mac world.

Text Editor Defined

A text editor is similar to that primitive editor those early microcomputer programmers used. It is sometimes line oriented, instead of page oriented, and it saves straight text (ASCII characters) without special attributes such as bold face or underlining. A line-oriented editor lets you type text and backspace to correct within that line, but once you press the Enter key it can be difficult to return to that line for editing. To change text in a line-oriented system, you usually enter a code or line number and the requested line is displayed for editing.

A page-oriented text editor still saves only ASCII characters, but you can use the keyboard or mouse to move around within a document to add new text or change existing text. Most text-only editors today are page-oriented editors. They don’t support special character attributes, but they do let you enter and change text anywhere within a document.

You’ve probably got a text editor right under your Apple Menu in the form of Apple’s Note Pad program shown in Figure 16-1. This is a light-duty text editor designed to let you...

Figure 16-1: Apple Note Pad
CHAPTER 16: WORD PROCESSING

Figure 16-2: How Many Copies of SimpleText Do You Have?

generate short notes for printing or email. You also have the more fully featured SimpleText that gets installed with just about every program Apple ships. If you do a find for SimpleText, you are likely to see something like Figure 16-2. You had no idea they were there, right?

You end up with 20 copies of SimpleText because software manufacturers frequently give you a copy to be sure you can read their “read me” files and documentation. You can also use SimpleText to whip off short notes, letters, and other text. Just look at all of the options under the SimpleText menus in Figure 16-3. For some users, this may be all the word processor you’ll ever need. We’ll look at it in detail later.
One other feature to look for in text editors: how they handle the end of a screen line. Some editors continue to string text together until you press Enter, inserting no special characters or paragraph marks unless you enter one. Others—especially those for PC DOS and some machines—automatically add a paragraph mark at the end of each line. If you intend to import a text file into another program such as a true word processor or page layout application, then you don't want these forced paragraph marks. Some word processors can import files that have a paragraph mark at the end of each line and strip them out automatically. That makes the conversion job a whole lot easier.

**Word Processor Defined**

Although it is fairly easy to define a text editor, a tight definition of a word processor is more difficult. The simple definition could be a high-end text editor. If we use that as a basis, consider what high end might mean.

Take a basic page-oriented text editor and add the ability to format characters with bold face, underline, italics, variable font size, and so on, throw in a spell checker, and add a few extras and you have a word processor.

These can range from a full-featured application such as Microsoft Word or the subtle power of BBEdit, shown in Figure 16-4. Even lowly SimpleText is quite powerful. In the next section we'll give you some more details on what to expect from today's word processor programs.

*Figure 16-4: BBEdit*
Today’s Program Features

After many years of using computer systems and working with and teaching users of computer systems, we know that one thing is certain: most computer users access only a small percentage of the power of even their most-used software application. It is easy to understand. We install a new program usually for a specific reason: to complete a pressing project, to start work in a new area, or to make present projects easier. As soon as we learn how to attack the specific area for which the package was purchased, we usually stop learning. There’s plenty enough to do just getting that one specific job done without spending time learning about extra features.

However, this normal approach limits the value of your software investment and short circuits your ability to do your job more efficiently. How many times have you entered a hardware store, variety store, or specialty shop in search of a specific item, only to exit with a shopping bag full of things you didn’t know you needed? You found out you needed these additional items by browsing the aisles, discovering things you didn’t know existed.

The same thing happens when you browse the aisles of your word processing software. Have you explored the ability to create an index in Microsoft Word? Have you looked into Publish and Subscribe inside ClarisWorks? If you accept only the features you knew about when you bought the software, you’re getting less than you might if you knew a little more.

Bare Bones Software takes this quandary and turns it on its ear with BBEdit. You have the ability to add ability with plug-ins. Browsing the aisles at their website can really be dangerous. Like the hardware store, the website can entice you to carry home lots of little extras.
Each package is different, of course, but in this section we want to introduce the concept of full-featured word processing. As you browse these concepts, pick up the documentation for your own word processor so you can find out how to conduct the tasks that interest you.

The Basics

We’ve already mentioned some of the basic functions in a word processor: text formatting. In today's market, this and other features are expected in all but the most rudimentary text management package. Look for these basic features in any word processor worth its name:

**Page-Oriented Text Entry and Editing:** We’ve discussed this basic feature. Obviously, page-oriented data entry and editing is a very desirable word processing feature. Anything less would make typing and revision a laborious, slow process. Any word processor today supports page-oriented entry and editing.

**Text Formatting:** Even basic word processing programs should support fairly sophisticated text formatting features. It should be easy to set selected text or whole sections or documents in a specific format such as bold face, italics, underlined, and so on. Some word processing software that might be considered otherwise fairly basic go beyond this basic formatting to include text shadowing, outline characters, or colored text.

**Text Find and Replace:** It is fine to be able to enter and edit text, but with large documents you also need to be able to search for specific information and to change that data if you wish. This feature lets you find one or more occurrences of a word or phrase. It also lets you change automatically the spelling of someone’s name or the title of a department throughout a document. Advanced Find and Replace will let you find special characters such as paragraph mark, character formatting, tab, and so on.
Multiple Fonts: The days of font compatibility issues ended with the birth of the Macintosh. Even SimpleText lets you adjust fonts from the appropriate menus shown in Figure 16-5. This is because fonts are supported at the system-software level. Every program can have access to them.

![SimpleText Font Menus](image)

Figure 16-5: SimpleText Font Menus

Early word processors mostly supported only monospaced typefaces such as Courier, but today's software lets you choose among a broad range of interesting typefaces. You can mix them. You can match them. You can waste hours deciding among them (refer to Chapter 8—Fonts for more information on Macintosh fonts and finding add-on fonts for your applications).

WYSIWYG Screens and Printing: In the ideal computer world what you see on your computer screen is precisely what you want to see on paper and, more important, when you print what you see, it looks the same on paper. Fortunately, *What You See Is What You Get* (WYSIWYG) was the idea behind the Macintosh. You've had it since 1984. It wasn't always so. Very early word processing was only a rough
approximation of the final printed page. Today, virtually any word processor lets you put on paper what you can see on your screen—or at least the two will be very close in appearance.

In a reversal of what you would expect, WYSIWYG is so good that it is worse off today. The problems arise when your many WYS choices and WYG choices confuse you. In the beginning, what you saw on your 72-dpi Macintosh screen was exactly what you got on your 72-dpi ImageWriter printer. Today, you can be looking at a screen resolution of 1024 x 768 and printing on a 600-dpi printer. What you see can vary greatly based simply on resolution, and what you get is often better than what you saw anyway! For its added complexities, the modern Mac gives you a much cleaner and crisper product than that first Mac 128 ever dreamed of. Hey! You don’t even need to deal with tractor-fed paper anymore.

Intermediate Features

Support for Graphics and Pictures: There’s more to word processing than text. In today’s personal and office environment it is a rare document that doesn’t include some kind of graphics, from simple clip art to illustrate a point to high-resolution photographs. Today’s word processors—to one degree or another—support this need for document illustration. The more advanced products approach desktop publishing in their ability to import graphics from a wide variety of sources, format the images, and place them virtually anywhere you want within a document. Any of your mainstream word processors will support this on the Mac. Some, such as Digital Harbor’s WAV, go a step further and let you embed sounds and movies into independent documents as well.

ClarisWorks is just one of many word processors with built-in graphics support. If you look at the screen in Figure 16-6, you’ll notice that you can adjust how the objects appear in the document. You can change how text flows around them, and you can even resize them.
If this is an important feature but you don’t consider yourself much of an artist, then consider purchasing some clip art. You can buy entire CD-ROMs full of art to use in business or personal correspondence. You can spruce up the church bulletin, add zest to your homework, or publish your own zine. ClarisWorks and other programs even include some built-in clip art. These selections in Figure 16-7 can be modified and added to over time. Add your own photos with scans or a digital camera.

**Spell Checking:** At least simple spell checking should be a part of every word processing package, even at the basic level. Still, this fea-
ture is a low-intermediate offering. Most any serious word processor supports spell checking from a dictionary of 50,000, 100,000, or more words. Some software will let you create your own dictionary from scratch or fill in new words as you use the product. Other companies and third parties sell add-in dictionaries for special disciplines such as medicine, legal, and engineering.

Generally, this process begins with a selection from your menu or floating button bar. In Figure 16-8, you will find a variety of writing tools found in ClarisWorks. Look for them under your Edit menu. In addition to spell checking, you will notice a thesaurus and other tools.

When you start spell checking, you will get a window similar to the one in Figure 16-9. Again, this is ClarisWorks, but your word processor will look similar. Spell checkers offer helpful suggestions and offer you the chance to skip, modify, or learn the words it doesn’t recognize.
Be careful of over-zealous button clicking. If you don’t pay attention to what you are doing, you may mistakenly “correct” a word incorrectly. For example, your word processor may suggest the word “better” when you meant “batter.” Another pitfall is the Add to Dictionary or Learn command. If you accidentally click this option, you could actually add a misspelled word to your spell-checking dictionary.

Grammar Checking: Grammar checking takes the spell checking feature one step further. Is your sentence structure run-on? Are you using the passive voice? Is this sentence too complex? Have you erred in subject and verb agreement? Today’s grammar checkers will tell you about it. As with spell checkers, use the grammar checkers’ suggestions with caution. The program isn’t always as smart as it thinks it is.

Templates or Wizards: Different software companies call these features different things, but in general a reasonably capable word processing package should provide you with a number of preformatted documents and programs to help you do your work. For example you might find a preformatted newsletter template or sample file, an invoice file, a brochure, and so on. Programs or wizards might step you through the process of filling in these forms, automating most of the process.

From some applications you can open these as separate files and in others you will find them embedded under your Help menu as shown in Figure 16-10. In addition, you may have several other assistants, editors, and templates installed with your word processor as with ClarisWorks, shown in Figure 16-11.

<table>
<thead>
<tr>
<th>About ClarisWorks Help</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show Balloons</td>
</tr>
<tr>
<td>Frequently Asked Questions</td>
</tr>
<tr>
<td>ClarisWorks Help Contents</td>
</tr>
<tr>
<td>ClarisWorks Help Index</td>
</tr>
<tr>
<td>Introduction to ClarisWorks</td>
</tr>
<tr>
<td>ClarisWorks Assistants...</td>
</tr>
</tbody>
</table>

Figure 16-10: Help Menu
Outlining and Other Document Views- As you work with more complex documents it can be extremely useful to view your information in different ways. If you use specific section header style consistently, many word processors will convert your document into an outline. You can switch between outline and document view and you can move whole sections of a document by moving just the main outline title. Because the World Wide Web is becoming such an important part of our computer lives, many word processing products let you view a document in online format. Again, this view generally requires the use of consistent heading styles, but it gives your document a hypertext look with hot links to various sections, or it sets up the document in frames so you can access document sections with a single click.

Columns and Tables: It can be useful to be able to display and print a document with multiple columns, like a newspaper, or with information displayed in tables. Newspaper columns are sometimes called snaking columns, referring to the way new text flows to the bottom of the current column, then begins at the top of the adjacent column when the current column is full. You use this document style to produce continu-
ous text in a newspaper or newsletter format. You may also want to use adjacent columns or tables to create lists, such as price lists.

**Multiple Keyboard Support:** Depending on your work habits and who uses your software, the ability to install foreign language or specialty keyboards may be a desirable feature. If you look at the keyboard Control Panel in your Control Panels folder under the Apple menu, you will see that there are several foreign keyboard layouts already waiting for you as in Figure 16-12. Customized and specialty keyboards will install their own options there.

**Foreign Language Support:** If your word processing work crosses borders, it could be useful to have a program that understands a foreign language. You have already seen how accessible keyboard layouts are. You’ll want to make sure your applications are WorldScript-savvy to take advantage of Apple’s built-in language support. Many products can display and print the special characters required of several foreign languages. Sometimes this capability is coupled with support for a special keyboard; sometimes you can get foreign characters with special key combinations.

**Page Formatting:** With all but the most basic documents you need to have control over how information is formatted on a page. This includes top and bottom margins, header and footer information, and text flow around graphics or special text elements. These controls should be
under your menus and look something like Figure 16-13. You may also be able to change these settings on the fly with on-screen controls. Usually these will control margins, alignment of text, and other features from somewhere near the top of the page.

![Figure 16-13: Document Setup Menu](image)

**Multiple Printer Support:** Today's printer market is extremely varied. Although you may have the one perfect printer for your word processing jobs, who knows what you might need in the near future? The Mac provides exceptional printer support, letting you print to almost any printer on Earth. From inside your word processor, you control your printer options from the Page Setup window shown in Figure 16-14. You can get to it from under the File menu in any

![Figure 16-14: Page Setup Window](image)
application that can print. See Chapter 10—Printing for more information on using a printer with your Mac. Your word processor will let you know if you have your page formatted outside of your printer’s boundaries.

**Macro Support:** Macros, small programs you write yourself or record automatically with the keyboard or mouse, can be great time-savers. You can use macros for very simple tasks such as entering your company name and address in a document when you press a keyboard combination. With some word processing software you can write or record much more complex programs. You could search for specific text in one document, for example, copy it to a second document, change it, print it, then save it to disk. This type of program might be useful if you wanted to extract repeated parts of one document to create a separate document with a list or summary.

**Styles:** A word processing style lets you establish how certain text should appear, then change that appearance throughout a document or series of documents by modifying the style definition. These style definitions will appear on a button bar or in their own floating palette as in Figure 16-15. They can be very useful. For example, you can design a top level heading style that uses a 14-point bold Helvetica font. Then, anywhere in your document you want a top level heading to appear, you invoke the heading style to set its characteristics. At a later time you can decide that you’d really prefer a 16-point Arial font instead. If you change the style definition, then every occurrence of the top level heading changes automatically from Helvetica to Arial font. Styles can be very useful in refining document formatting, and most serious word processing software uses them.

*Figure 16-15: Floating Palette*
Advanced Features

Cross-Application Compatibility: In today's business or personal environment, no computer is an island. As much as you love your Mac, you probably work or live with folk who use PCs or workstations running different operating systems. If the word processor you choose also runs on other computer platforms, chances are it should be fairly easy to share documents with other users. Look for the ability to save your work in a variety of different digital flavors as shown in Figure 16-16.

Import and Export Lots of Data Formats: Many high-end word processors include converters or translators that let you load and save documents in other formats. You might be using Microsoft Word, for example, but you are working with a colleague who uses WordPerfect on a PC. Before sharing the file over the network or before you send a diskette to the colleague, you can save your document in WordPerfect format. These translations are seldom perfect, but they make working in a cross-platform environment much easier than if you had to save everything to ASCII before sharing with someone else. At least the basic formatting and document layout usually can be preserved. In addition, you need to be able to import graphics images in multiple formats.

Publish and Subscribe: There's more to interoperability than data sharing across computer hardware and operating systems and the ability to import and export data. The latest products also let you link to other applications or files on your Mac or even across the network. Suppose you are using data from a spreadsheet in your word processor document, for example. You can re-type the information, you could drag-and-drop or cut-and-paste to copy it, or you could create a Subscriber. If
your word processor supports Publish and Subscribe, then you paste a pointer to the required data. The full information appears in your word processor document but now if you or someone else updates the spreadsheet information, your document also has the latest version. This is a powerful tool that is extremely useful in a business and networked environment. See more about it in Chapter 5—Organizing and Customizing Your World.

**Integral Support Applications:** Many word processing packages include additional support programs to help make your job easier. There may be drawing packages, for example, or photo editing software, charting add-ins, or special text-formatting applications. When these come with your word processor it can make the creation of high-end documents easier, obviating the need to import data from third-party programs.

**Mail Merge:** Mail Merge or document merge is among the most important word processing features for many users. It lets you type a master document and merge information into it from a secondary file. You can use this feature to generate form letters to a mailing list, for example, or to create professional—or service—type invoices, to build custom advertising letters, and the like. The most flexible mail merge products can access data from a spreadsheet or database application as well as from inside a word processing document.

**User Customizing Features:** No matter how well-designed your software is, there are times when you’d like it to look or operate differently. Some word processing packages let you move and create menu items, create custom tool bars, change screen colors, and more, to create a unique set of features and a custom operating environment. If you are using any of the mainstream word processing products, chances are it supports at least some form of user customization. Check it out! You may find your productivity improves when you remove unwanted menu choices or when you create custom toolbars that support just the features and functions you use most frequently.
HTML Compatibility: One easy way to share information with other computer users is to place documents on a local area network or on the Internet in HTML (hypertext markup language) format. This is the text-based, interpretive programming language of the World Wide Web. If your word processor lets you save documents in HTML format, this process becomes extremely easy. As with any document conversion or export operation, the process is rarely flawless, but if you can automate the initial conversion of your word processor documents to World Wide Web format, then it becomes almost a trivial task to fine-tune the HTML file in an HTML editor. Converting a document to HTML can be an easy way to share a large document with lots of graphics with remote users. Sending such a file by email doesn’t always work and can be slow. If you can save the document to a local server in HTML format, the remote user can access it with a Web browser quickly and easily.

Internet Support: The Internet is increasingly a part of our business and personal lives. A word processor that can access Internet resources to upload files or update information can be a useful addition to your work tools. A few commercial products, including Microsoft’s Word program, provide fairly decent Internet support.

Programming Support: We’ve mentioned macro support previously. However, some word processors go beyond simple macro programming to support full-scale program development in Visual Basic, Visual C, or other high-end language. This is another area where Bare Bone’s BBEDIT excels. It is a modular application with support for various programming standards and conventions. This makes it popular for everything from C programming to writing HTML for Web pages. Other products support high-level languages only for internal programs. In other words, you can write Visual Basic or other program modules to control the word processor, but you may not be able to use those modules somewhere else as standalone programs.

Automatic Lists: Another powerful word processing feature is support for automatic lists. This can be anything from a table of contents to an
index to a list of figures or authorities. Most programs that support lists require that you insert special formatting for the words or phrases you want to include in a list, then when you choose a menu item or run a program, the document is scanned, and the list is generated automatically.

**Practical Word Processing Applications**

In the early days of microcomputing there were only two application programs for most of us, word processing and spreadsheets. There were programming utilities, of course, but for people who only wanted to use the machine, not program it, software was limited.

For this reason we learned to be fairly creative in what we could do with limited resources. Some users found a good word processor and used it for virtually everything they did with the computer. Looking back, it is really funny to see some of the jobs we shoe-horned into trusty word processing packages.

Today you can find a specialty software package to do just about any job you can imagine, but word processor software is still amazingly versatile. What you do with a word processor depends on your business and personal needs, but as you work with this software toward specific ends, let your mind open up to other possibilities, including:

- Advertising Mailings
- Book Manuscripts
- Business Letters
- Employee Manuals
- Instruction Manuals
- Newsletters
- Poetry
- Price Lists
- Reports
- Beginning Web Page Design
- Brochures
- Email Editor
- Home Inventory
- Legal Briefs
- Personal Letters
- Presentation Scripts
- Recipes
- School Grade Sheets
CHAPTER 16: WORD PROCESSING

School Tests  Songs
Speeches     Student Lists
Telephone Lists

True, some of the applications we have suggested can be better handled by other programs. Home inventory, for example, is really a database application. Grade sheets could be handled in a spreadsheet application. However, if your files are small and you are really familiar with how your word processor works, using it for these tasks makes a lot of sense. You won't spend a lot of time learning how to use a program you don't need very much, and by stretching the capabilities of your word processor you learn more about its internal design so you can use it to do even more.

Look, too, for specialty word processing products such as script-writing tools, fiction-writing utilities, indexing tools, and the like. An increasing number of these specialty products is available today and, if you spend most of your time writing in a particular genre that is supported by a specialty package, go for it. You can save a lot of valuable time that you'd otherwise spend formatting to match an industry or client guideline.

Word Processing for the Macintosh

If you used a Mac long enough ago, then you will remember when the main ability a word processor needed was to fit on a single 400K floppy disk with the System Folder. Early Macs lacked hard drives, and swapping floppies was a pain. The word processor Write Now made its name in those days.

By far the most popular word processing package on the Macintosh for years was Microsoft Word. Other word processors had their followers, but Microsoft Word was the closest thing to a standard. Then Microsoft created Microsoft Word 6.0 and did the biggest favor imaginable for Nisus Writer, Claris Works, and WordPerfect.
Microsoft Word 6.0 was a windows port, and a sloppy one at that. It ran slower than Word 5.1. It was harder to use. It wasn't remotely Mac-like! Luckily, Microsoft Office 98 corrects some of these deficiencies.

One popular package on the Mac platform is ClarisWorks. Unlike the less fully featured Microsoft Works, ClarisWorks is actually a very powerful word processor with spreadsheet, communications, and database support built in. It also comes with a built-in library of clip art. The newer ClarisWorks Office or ClarisWorks 5.0 reflects this package's evolution from utilitarian tool to powerful productivity suite.

We've listed some of the better Mac word processors below.

**Popular Mac Word Processing Packages**

**BBEdit:** www.bbedit.com - BBEdit has got to be one of the most fully supported component software packages around. There are dozens of BBEdit plug-ins to solve problems ranging from stray characters at the end of imported text to formatting Web pages and program code.

**ClarisWorks:** www.claris.com - Many early software designs included everything you needed to do everything, including word processing. As user needs became more sophisticated and more products became available, the trend moved toward dedicated products. ClarisWorks stayed the course and this program does it all, word processing and more. The new ClarisWorks Office reflects the advances incorporated in the individual components of this package. Also available for Windows computers, a cross-platform Macintosh user will find a great deal of comfort in the familiar interface.

**ClarisWorks for Kids:** www.claris.com - This is a scaled-down version of the popular ClarisWorks integrated package that targets users up to 12th grade. As you can see from Figure 16-17, it is a playful program. This is a cross-platform product that can fit in well with a mixed computing environment where part of the family uses a Mac and others use
a Windows platform. It features a wide variety of kid-friendly features and entertaining additions.

**Microsoft Word:** [www.microsoft.com](http://www.microsoft.com) - Microsoft Word has become the standard for business-oriented word processing on Windows platforms. It is also available for the Mac. Indeed, the latest versions of Word merge very well onto the Mac platform and have the Mac look and feel, even more so than previous releases. A useful tool in a cross-platform office environment.

**Microsoft Works:** [www.microsoft.com/works](http://www.microsoft.com/works) - Microsoft Works is a medium- to low-end integrated package that supports word processing, spreadsheet, and database functions. It is basically compatible with Microsoft Word and other Microsoft data management products, and there are plenty of add-on utilities, templates, clipart, and more for this program. Like MS Word, however, it is a better performer on a Windows computer than on the Mac.

**WAV:** [www.dharbor.com](http://www.dharbor.com) - This is one of the many programs developed for OpenDoc. Since most support was pulled, Digital Harbor has bundled the best parts of this technology with its word processing application. Create documents linked to live websites. Create documents with embedded movies and sounds.

**TykeWriter:** [www.shareware.com](http://www.shareware.com) - As the name implies, this is a word processor targeted at the young set. In fact, this program is specifically designed for children who are just learning to read and write. You can start with a very basic configuration, then as the child learns more, you can add more features by changing the level setting on the program.

**HyperWorks 3.22:** [www.shareware.com](http://www.shareware.com) - This shareware offering is another integrated package that includes word processing, MacPaint-style graphics, database, graphing, and financial management. Requires HyperCard 2.
Add/Strip 3.4.1: www.shareware.com - Use this utility to convert text files you download from the Internet or that you get from DOS-based machines and mainframes. These text files frequently contain extra carriage returns, special characters, and other garbage that make it difficult to use the file with a Mac program. The Add/Strip feature of this program scans text files and does a pretty good job of putting them into a format your Mac will like.

Scorpio 1.1: www.shareware.com - This is a graphics-oriented word processor that displays your text as a document page. New pages are added as you type and you can display right- and left-hand pages differently.

My Notepad 2.0: www.shareware.com - You already have Apple Notepad with your computer, but if you want to add more features, then this shareware program may be the answer. Find function finds text in hundreds of notes quickly. Includes custom font, size, style and color options, plus superscript, subscript, strike through, and invert styles.

MacWrite Pro: www.claris.com/products/ - MacWrite is ClarisWorks’ standalone word processing package. It offers medium- to high-end word processing features, including multiple language support and compatibility with other file formats.

Nisus Writer 5.1: www.hic.net/goliad/jumpto.htm - This is a comprehensive word processing package that includes many high-end features. This program is promoted as a credible competitor for such well-known products as Microsoft Word and Corel WordPerfect. Supports multimedia features such as movies, sound, and text-to-speech.

Ichitaro: justsystem.co.jp/products - This is a specialized Japanese word processing program. Ichitaro started life as jX-WORD Taro and has been among the best-selling Japanese word processing programs. Japanese language word processing represents some high-technology
features because of the broad range of characters that have to be supported and the graphics nature of them. If you have a need for native Japanese word processing, check this out.
IF THERE IS ONE TECHNOLOGY THAT HAS CHANGED THE LIVES computer-savvy businesses and individuals more than any other over the past five years, it is the Internet. The Internet has a 30-year history, but this fascinating online world has seen more growth in the past five years than in all the previous quarter century.

In this chapter we will introduce you to the Internet, its features and technologies, and show you how to get the most out of your online life with your Macintosh computer.

Background and History

Not that long ago the concept of sitting in front of a computer in your home and reaching out to individuals and information resources all over the world would have been the wildest science fiction. The Internet began during the 1960s as a government project designed to improve global communication for the military. It was conceived as a reliable, redundant network that could survive man-made and natural disasters.

That goal was a success. This global network can still take a bending and keep on sending because of the multiple data paths that are maintained among key points around the world. From that initial military-centric view, the Internet broadened over the years to include colleges and universities, military and government contractors, other govern-
ment offices, scientific and research firms. By the late 1980s, this electronic superhighway was populated by a dedicated cadre of mainframe- and workstation-connected computer users who were sharing research information, asking each other for help and direction, transmitting forms and files of a broad description.

Still, the Internet was restricted to the knowledgeable, those with a need to know. By 1990 or so the government had begun to hint at an opening of the Internet to commercial activities; computer hardware was becoming more powerful, cheaper, and more available; and, creative users were writing software that made online communication easier and more efficient.

As the government reduced, then eliminated funding for the Internet, commercial companies stepped in. Internet Service Providers (ISPs) set up business in basements and back rooms and started providing Internet access to anyone with a modem and $300 or so in monthly fees. Luckily, such high prices didn't last very long as more companies jumped in to provide Internet access. At the beginning of 1998 the average monthly access fee for dialin 28.8 bps or faster service is about $20, but look for this number to rise slightly as companies consolidate, provide better service, and try to make a little profit from the Internet.

**Internet Technology**

Before we delve into how to use your Mac to access the Internet, let's spend a little space reviewing the technology of the Internet.

Just what is the Internet, anyway?

With apologies to Douglas Adams, the Internet is big. Really big. You just won't believe how vastly, hugely mind-bogglingly big it is. You may think it is a long way down the hall to the local fileserver, but that's peanuts compared to the Internet.

The simple answer to the question “What is the Internet?” is that the
Internet is a global computer network, but that begs the next question, What is a computer network? That, too, can be defined fairly simply. A computer network is merely a physical connection among computer systems that includes software to allow these connected systems to share resources such as printers or disk drives. Figure 17-1 shows a simple drawing that illustrates the small-network concept.

![Figure 17-1: Sample Network](image)

The need for computer system interconnections grew rapidly as users became more separated with the move of computer power to the desktop. We soon discovered we had lots of data stored in large files—too large for a floppy diskette—that we needed to share with each other. Desktop system networks grew first within individual buildings (Local Area Networks, or LANs), then as we moved further apart, we started connecting across town, across states, and across the country (Wide Area Networks, or WANs).

The next step in this evolution was to connect networks to one another. A LAN in the accounting department might connect to a LAN in administration, linking select machines on each network through a single internetwork connection.

Now, let's ask the question again: What is the Internet? With the foregoing background, the answer is a network of networks. At any given time there may be 10,000 to 20,000 networks connected together using local network wiring and long-distance telephone company trunk lines. Now imagine that these networks are distributed around maybe 200 countries with 100 million or more users connected, and you have a general idea of what the Internet is.
The Internet is the physical connection of computers and computer
networks into a global, electronic community.

Using the Internet

Once you have connected thousands of networks and hundreds of mil-
lions of people in hundreds of countries, what do you do? What are the
major tasks that attract so many people to the Internet?

The answers to those questions change regularly and rapidly, but
there are a few stable answers. Since the beginning of Internet growth,
the most popular online application has been electronic mail, the ability
to exchange text, graphics, and program information with other users
through an electronic link. Although other applications are gaining
ground, it is still true that 90-some percent of Internet users say they
use primarily electronic mail. Figure 17-2 shows you one of the most
popular Internet email programs, Eudora.

The second-most-used application is the World Wide Web. This is the
part of the Internet that gets most of the news media attention, and it is
the part of the Internet that is most in our faces through advertising and
promotion. You’ve seen references to the Web if you’ve ever read a mag-
azine advertisement, seen a billboard, or watched television. The
www.companyname.com is a reference to a location on the World Wide
Web where you can go to find additional information. Figure 17-3 shows you the basic World Wide Web interface in Microsoft’s Internet Explorer.

![World Wide Web Interface](image)

*Figure 17-3: World Wide Web Interface*

After email and the Web, the most-used applications depend on individual preference and experience. The older, traditional Internet resources such as gophers and gopher search engines are still there, but if you don't already know what these terms mean, you'll probably never use these resources. You might, however, find that newsgroups provide an interesting and useful resource. An Internet newsgroup is really a discussion group, a place you can go to read what other people have to say about a particular topic and to offer your own ideas to individual users or to the group at large.

Increasingly the Internet is used for real-time video and video conferencing, Internet telephone communications, and application sharing. In the following sections of this chapter we'll introduce you to these popular Internet facilities, show you the software and other Mac resources you need to use them, and provide some hints on getting the most out of your Mac-Internet combination.
Connecting to the Internet

Before you can use all the interesting and useful features of the Internet, you have to get your computer connected. In the early days there were few options for connecting to the Internet. Today you can get online in many, many ways.

In general you need the services of an ISP to get attached to the Internet. ISPs have been likened to the on ramp of an Interstate highway. These companies build their own local area networks within each city they serve. They then order a number of telephone lines from a local phone company and connect a bunch of modems to these lines.

Now, if you have an account with this particular ISP, you can use your modem and computer to dial the ISP's access number, log onto a server within its LAN, and then connect to the Internet. Your connection to the Internet is made through one or more high-speed telephone lines owned by the ISP. You could buy one of these lines for yourself from a long distance telephone company, but you'd pay many thousands of dollars in equipment to connect to it, and you'd spend another two or three thousand dollars a month to use the connection.

The ISP model works because these high costs can be spread across a large user base so that no single user has to spend a lot for the privilege of connecting to the Internet.

That's the 40,000-foot view. In actuality there are more choices and more decisions that you can make to control your access to the Internet.

Dialup Access

Although network access technology is changing rapidly, by far the majority of Internet users get online by using a modem and an analog telephone line. You can use the standard phone line that comes into your home and, in most cases, the telephone line that comes to your desk at work.
The modem converts the computer's digital information into sound signals that can be transmitted over a telephone line. Using special software, you dial the phone number for your ISP, and the modem on the other end answers. The two modems negotiate with each other on how fast they can talk, agree on a speed and protocol, then the remote computer asks your computer for a user name and password. Figure 17-3 shows a simple drawing of this dial-in connection.

Once you are verified as an authorized user, the two modems settle in to wait for you to send something over the newly established link. Then you load email, World Wide Web, or other software to make use of this Internet connection.

Modem specifications can be confusing and the people selling modems and online access don't always tell you the full story. For one thing, there are modem standards that dictate how each device communicates. The standards for modems through 33.6 bps are pretty well set, and any company's 33.6 bps modem should be able to talk to any other 33.6 modem that meets the standards. There are two competing standards for the 56K bps modems, and if you have a modem of one type, it won't talk 56K with a modem that is designed around the other standard.

The competing standards are known as K56Flex and .X2. The Flex standard is used by such equipment manufacturers as Lucent technologies/AT&T, Motorola, Rockwell, Ascend Communications, Cisco, MultiTech, Hayes, Microcom, Compaq, HP, AST, and Toshiba, while .X2 is the design of choice for U.S. Robotics, among others.

The good news is that most current 56K modems can be upgraded to whatever the final standard happens to be by downloading software over the Internet, but you should be aware of the evolving nature of the modem business. For a summary of 56K standards and practices, go to http://www.usit.net/56k/ or http://www.56k.com/.
If you are like most users, you will use a modem capable of transmitting 28,800 bits of data per second (28.8K bps). If yours is an older modem it is rated at half that speed; if it is a newer modem it is rated at 33,600 bps (33.6K bps) or 56,000 bps (56K bps). With 56K technology, the downlink speed (data moving from the Internet to you) is rated at 56K, but the uplink (information you send back to the Internet) is at 33.6K, maximum.

Be aware that you may not always be able to achieve even a standard speed such as 28.8K in the real online world. The fact is that many of the analog telephone lines we have in our homes and offices, and the lines that connect these buildings with the telephone company's central office, are old. Don't be surprised if you only get 16,200 bps or 21,600 bps on a 28.8K link. Using 56K technology? Forget about it! No one we know has ever gotten consistent 56K connections except in a laboratory environment or where all of the telephone lines in the loop are brand new.

**ISDN Access**

Among the faster-access options popular today is ISDN, Integrated Services Digital Network. ISDN is not a new technology. It has been around since at least the early 1980s, but it did not take off as the early designers expected.

With the rise in popularity of the Internet, however, ISDN has taken on a new life. This digital telephone technology lets you access the Internet at 64K bps or 128K bps, depending on whether you use both available data channels or only one. We don't want to spend a lot of time on ISDN technology here, but basically this is a digital communications technology that uses two standard telephone wires, the same as that used by your regular home or office telephone.

**Access Software**

You need two types of software to use the Internet. First, you need software that connects your computer to the Internet network. This is done
with some form of TCP/IP (transfer control protocol/internet protocol) software. TCP/IP is the networking protocol used for computer-to-computer communications over the Internet and other networks. On the Mac today your TCP/IP access is almost exclusively handled through Open Transport's TCP/IP control panel shown in Figure 17-4. Open Transport integrates all of your networking into one interface and comprehensive package. If you have an older version of the system software, you may be using MacTCP shown in Figure 17-5 instead.

![TCP/IP Control Panel](image)

Figure 17-4: TCP/IP Control Panel

Usually telephone dialing and modem interface features are built into the TCP/IP software you use to connect your computer to the Internet network. This software is used to make the initial connection to an ISP, to log onto the network, and to establish two-way computer communication.

Once you are connected to the network and your computer is communicating with a host computer or host network

![MacTCP](image)

Figure 17-5: MacTCP
that is part of the Internet, you will launch one or more application-software packages. This might include a World Wide Web browser, an email program, a news reader, and so on.

If you are on an Internet-connected network, then the access is probably already set up for you. You can simply launch your applications. Usually, though, you have to make a connection to the Internet yourself with the control panel in Figure 17-6. The most popular tool for the Mac is again included with your OS and Open Transport. Point-to-point protocol, also called PPP, is used to make the modem-to-modem connection with your ISP. After that, TCP/IP pours out over the wires and you are online. If you have an older system, then you are probably using some form of MacPPP, shown in Figure 17-7.

![Figure 17-6: PPP Control Panel](image1)

![Figure 17-7: Config PPP](image2)

### Using Email

The Internet is a client-server environment. That means that some of the work you need to do while online is conducted by software running on your Mac and some of it is performed by software running on one or
more remote hosts that are part of the Internet network. Luckily, you don’t have to worry about the server or host side of the equation. You do, however, need to install an email software client (such as Eudora or Claris Emailer) and configure it to work with your ISP.

The good news is that today most ISPs supply software that automatically installs an email client and configures it for you (see the software section later in this chapter for information on specific email clients). Most Web browsers also include some form of email support, though these generally are configured only to let you send mail, not receive it.

To understand how to use your email client, you should have at least a basic understanding of Internet email addressing. When you log into a local network that provides access to the Internet, your computer becomes part of that local domain, a logical entity that describes the computers and other devices you are using. Domains have names and they have unique, discrete numerical addresses.

Addressing an Internet letter is easier than sending a snail mail (online term for regular paper mail) letter. When you address a conventional letter you need six pieces of information to ensure timely and reliable delivery:
1) The name of the addressee
2) The street number of the addressee
3) The name of the street
4) The city
5) The state
6) The Zip code

Then, of course, if the destination is a foreign address, you may need other information or information in a different form.

Sending an email message is much simpler. You need to know the name that person uses for the Internet and you need to know the name
of the domain where the Internet mailbox for that person is stored and maintained. This information is entered on the To: line of your email client (see Figure 17-8). For example, to send an email message to author Sandy Clark, use this address:

Sandy@usit.net

Sandy's online name is sandyc and the domain that manages his email account is called usit.net, which stands for United States Internet. Use the commercial 'at' sign (@) to join the two email address components. Notice as well the CC: line. You can carbon copy email messages as well.

| Date:       | 10/29 9:55 PM       |
| Received:   | 10/31 12:21 AM      |
| From:       | Tom Badgett, tbadgett@synergysouth.com |
| To:         | 'sandyc@usit.net', sandyc@usit.net |

*Figure 17-8: Sample To: Line*

When you receive an email message, your email client will display basic information about the received message, including who sent it, the date and time it was sent, and a subject, which is supplied by the sender. You can open a received letter by double-clicking its entry in your email client. Then you will see the email header (to, from, date, and subject information), and the body of the message itself. A typical email message displayed in Claris Emailler for the Macintosh is shown in Figure 17-9.

*Figure 17-9: Sample Email Message*
Using the World Wide Web

Defining the World Wide Web can be even more difficult than defining the Internet itself. Popular terminology confuses the issue by referring to the Internet as “The Web,” blurring the distinction between the two. We’ll take a shot at defining the Web in this section, then we’ll give you some hints on how to use it.

First, let’s review our definition of the Internet. In summary, the Internet is a physical connection among computers or computer networks. These links are generally telephone lines built and maintained by major long-distance and local telephone companies around the world. This physical connection also includes Ethernet and LocalTalk wires that hook up individual computers on local area networks. We’ve already mentioned the superhighway or Interstate analogy to the Internet. The Internet is a physical medium over which information travels in much the same way an Interstate highway is a physical transport mechanism for trucks and cars carrying merchandise and people.

The World Wide Web, or more simply the Web, is a collection of information—and the organization of information—that travels over the physical Internet. The Internet is physical; the Web is logical or informational.

To use the Web over the Internet you need software, usually called a browser, that accesses specific Web locations and displays information in a graphical format. There are many Internet browsers, but by far the most popular are Netscape Navigator and Microsoft Internet Explorer (see the software section later in this chapter for more information).

Displaying Web Information

When you display a World Wide Web location (see the next section for information on how to find specific Web sites) you will see a graphics display that might include drawings, animation, sound, motion video, and text of various sizes and colors.
If you were to look behind the pretty display, though, you’d see something like the view in Figure 17-10. This is the source or program view of this same page. Web pages make use of several programming languages, but the most common is an interpretive language called HTML (hypertext markup language). HTML makes up the basis of any Web page. The interpretive description means that the language commands are written in plain text, and your browser interprets or translates the commands each time the page is displayed.

```html
<html>
<head><title>Welcome to U.S. Internet</title>

<META NAME="description" CONTENT="U.S. Internet is a full service Internet Service Provider (ISP) that serves the 423, 615, 931, 901, 540, 502, and 205 area codes in Tennessee, Alabama, Kentucky, and Virginia. Access speeds include 28.8, 33.6, 56K with Lucent and Rockwell's K56flex, as well as 64K and 128K ISDN, frame relay, T1, and fractional T1 service."/>

<META NAME="keywords" CONTENT="ISP isp isps isp's Internet Service Provider internet service providers access 423 area code 615 area code 931 area codes 901 540 502 and 205 unlimited flat rate national local 64K 128K ISDN 56K K56 K56flex Tennessee TN Kentucky KY Alabama AL Virginia UA web hosting cgi-bin cgibin free email Usenet newsgroups Windows 95 Macintosh search find list fractional T1 T-1 frame relay web page counters email forms"/>

Figure 17-10: Typical HTML Code
```

You can view the source of any Web page by choosing Source from the View menu.

Look at the Web site shown in Figure 17-11. Notice that some of the text is underlined (and if this were printed in color you’d see the underlined text is also displayed in blue). Blue underlined text on a Web page usually represents a hyperlink to another location within the current file or to a completely different file. Such a hyperlink can point to another file on the host you are using right now, or it can point to a file on a host anywhere in the world. Although different Web designers may choose to use a different formatting to indicate a hyperlink, they work the same and it will be quite obvious as you use a browser which text or graphics objects provide a link. When you hover your pointer over a hyperlink, the pointer changes to a pointing finger.
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Figure 17-11: Typical Website

Figure 17-11 is a graphical representation of how hyperlinks work. Suppose, as this example shows, you were viewing Apple’s main page. At this site is a discussion of OS 8 and software that supports it. If you click on one of these software links you are taken directly to the Web page of the selected software vendor. From that page you notice a FAQ (Frequently Asked Questions) link that takes you to a news group that discusses this software. You read some newsgroup entries and discover a link back to the Apple page.

This is a simple example—in reality the Web is much more complex—
but it shows the power of hyperlinks. This ability to link closely and loosely related topics and locations anywhere in the world is changing the way we read and do research.

The Web's graphical interface also is changing the face of computing. Until the rise in popularity of the World Wide Web and its graphical user interface, a Macintosh-user interface was completely different from a PC interface, which was completely different from a Sun workstation interface. World Wide Web browsers run on all of these platforms and others. Once you launch the browser software, which may require a slightly different process on each hardware platform, navigating the Web, sending email, printing information, and so on is virtually the same on all platforms. Web navigation is slightly different for users of Navigator compared to users of Explorer, but the differences are slight. In the future, look for the Web motif to become even more universal.

**Web Addressing**

When you launch one of these software packages, the program either displays a default Internet location or waits for you to tell it what location to display. Locations on the Internet are a little like email addresses in that you specify the name of a server or domain and the name of a file you want to display at that location.

Consider the browser screen shown in Figure 17-13. The location field at the top of the display shows the Internet address of this online site: http://www.usit.net/

This is a fairly simple Web address, but it provides a lot of information about the information you are viewing in the browser screen. Let's break down that address into its component parts.

**http://** This is standard Web terminology that indicates this Internet site is using *hypertext transfer protocol* (*http*). You don't have to enter the http:// as part of an Internet address, but the browser displays it any-
way. The software uses this part of the address to help it interpret the data being sent to your Mac. The reason for this part of the address will become clearer as you visit other types of sites on the Internet, using your browser. For example, if you enter an address that begins with news:// you will view a news site instead of a World Wide Web site. The browser uses different internal or external utilities to display different types of Internet data. This type of address is called a URL, for Universal Resource Locator. You can see that the first characters in the address - http:// or news:// - specify the resource and the rest of the address specifies the actual location.

www The www part of the address identifies the type of server you are accessing on the host. The remote computer you access with your browser may be dedicated to Web activities, or it may do multiple duty as a Web server, an email server, and more. The www part of most Web addresses points to the Web server at the specified site.

usit.net You saw usit.net as part of the sample email addresses we dis-
cussed earlier. This is the domain where the Web server is located. A domain, remember, is the name of a computer or computer network and is a unique Internet location. In this example, usit stands for United States Internet and the .net extension indicates that you are accessing a networking company or Internet provider. Other Internet addresses may have different extensions.

There's one other component of this sample address that you don't see: the name of the file or document that is being displayed. That's because by default your browser loads a file named index.htm or index.html. So when you specify an address such as www.usit.net you will actually see the file index.html. That makes the full address

www.usit.net/index.html

Suppose the file you want to display is stored in another folder beneath the default. The address you see in the location window would be longer. Here's an example:

www.usit.net/helpdesk/apps/

The same addressing convention is in play here, but the index.html file you view in this case is stored in a folder named apps, which is located in a folder named helpdesk, which, in turn, is stored in the default folder for www.usit.net. You really have no way of knowing the actual folder structure of a remote Web host, because the Webmaster can create logical and hidden folders to hold some of the files.

If you want to display a particular Web site on the Internet, you only need to know the address to enter in the Location (or Address) field of your browser. Click in the field and type the URL. When you press Enter the browser will attempt to locate and display the specified Internet location on the Web.

This addressing scheme can help you locate specific Web sites fairly easily and with reasonable accuracy. Even if you don't know the precise location of a site you want to view, chances are you can guess the prop-
er URL. For example, suppose you want to display an Apple computer Web site. Apple has many, many Web pages that you can browse, but wouldn’t you guess that a good place to start finding out about Apple on the Web is www.apple.com? Try this by typing the URL into your browser.

When you want to learn about any commercial company, you can probably guess the proper URL fairly easily. It may take a couple of tries, since you can’t be sure how companies with more than one word in the name choose to identify themselves on the net, for one thing. Besides, there are companies with similar names, so the actual URL you enter could point to the wrong company.

If you guess an address and get the wrong company, try another guess. Use both names, shorten the names, use the company abbreviation, and so on. Suppose you want to locate a site for Icom, manufacturers of two-way radios for amateurs, commercial business, and the military. Try www.icom.com, a logical guess, in the Location or Address field of your browser.

Oops! Instead of the electronics firm you get a page for a Web hosting company. Obviously they registered their icom domain before the electronics company got around to it. What else might you guess? Try www.icomcom.com, figuring Icom Communications might really be the name. Unless someone has registered this domain in the meantime, you will see an error message saying your browser could not locate the specified host.

Do you have a piece of literature or an advertisement for Icom (or the company you really want to find)? Look carefully at the actual name the company uses in its address. It may be something different from what it uses as the informal name. In the case of Icom, for example, the company address uses the name Icom America. Try that in your browser address field: www.icomamerica.com. Now you get the proper Web page, shown in Figure 17-14.
You should be able to guess the main corporate pages of most companies fairly easily. However, if you don't come across the proper address after two or three tries, stop guessing. You're wasting your online time. Instead, use one of the many Web search engines to find what you want.

**Using Search Engines**

Those of us who were using the Internet in the early days had a hard time of it. There were hundreds of interesting locations on the Internet, but finding and accessing this data was pretty difficult. Even after the World Wide Web came along with its URLs and friendly user interfaces, it wasn’t all that easy to get where you wanted to go.

Navigating the Web is easier today, thanks to the hundreds of search engines available to help you. A search engine is actually a software application that runs on an Internet host. You can run this software from your desktop, tell the program what you want to find, and it searches its own database of topics and locations to display a list of possibilities.

It is hard to know precisely how many search engines are available, but one site can show you somewhere between 250 and 300 of them, so the number is pretty large. There are general search engines that are designed to help you find any topic and there are topical search engines to help you locate information in a specific field. You can even use a
search engine to find a search engine appropriate for your current research.

If you want to browse a list of popular search engines, type this address in your browser's Location or Address field: www.search.com. You will see a screen similar to the one in Figure 17-15. One of the available engines is displayed as the default search tool, so all you need do to find something on the Web is type a word or phrase in the Search for: field and click on the Search button.

![Figure 17-15: www.search.com](image)

InfoSeek is the default search engine. If you use the default (or choose InfoSeek from the list of available search engines), then enter the text video, when you click on Search you will see the screen shown in Figure 17-16. As you can see the video topic is a popular one on the Web. This particular search turned up 697,040 sites, certainly more than you could review in any reasonable amount of time. This sample points up the necessity to planning your Internet search and of knowing how to narrow the results to get meaningful data.

How you do that varies somewhat with each search engine, but the general concept is to use more terms and specify that they all must appear on a found site. You'll learn more about searching the Internet by
doing it, and with experience you'll learn how each search engine differs and where it excels.

One way to begin learning the differences among search engines is to conduct the same search with another engine. From the www.search.com site locate the hyperlink for Alta Vista. If you have conducted a search, this link will be at the bottom of the results page, otherwise it is to the right of the Search: field. Alta Vista is a comprehensive engine that maintains the most detailed database of information, in our experience, and one that incorporates sophisticated and flexible search criteria. Click on the Alta Vista icon to present the search field for this engine.

Again, in the Search: field enter video or another word you want to find. If you have previously done a search for the same word in another engine on this site, Alta Vista automatically picks up the search term and displays the results.

The number of hits in this search jumped from around 600,000 to over eight million! That's because Alta Vista stores in its database words from every page on a site and from every area of a page instead of just words from the title and subject areas, as with many other search engines.

Obviously, we have not helped the problem of too much data by doing the same search on Alta Vista. We've got to narrow the topic before we'll get any really useful information.

In this example, suppose we're really looking for information on digital video. We could enter the words digital video in the search field instead of just video, and Alta Vista would find all sites that mention digital as well as video. We tried that search and got the results shown in Figure 17-17. The search engine identified more than six million sites that contained the word digital and more than eight million sites that contain video. Sites that contain both terms are displayed in the results.
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Not all search engines work this way. In some engines if you enter two words the search software will locate all pages that contain the first word, then locate all pages that contain the second word. There may be some pages that contain both words, but the search is definitely not very specific. You can find out how to use individual search engines by clicking on the Help button you will find near the Search field with many of them. If you're unsure how search terms may be interpreted, enclose all terms in quotes: "digital video."
If you’re just learning about a topic, then start the next phase of your search by opening a few of the found pages. On these pages you may get some ideas about specific topic areas you want to see or terms you can use to narrow the search. Let’s take this digital video example a step further.

The results pages of our sample search include information about digital video editing, video engineering, video technology, broadcasting and a range of other topics. Suppose our area of interest is really about digital video editing—specifically editing software for the Macintosh—and we don’t want to see anything about broadcasting or engineering or the PC. We might specify search criteria such as this:

“Digital Video Editing”+Software+Macintosh-PC-Broadcasting-Engineering

This search string says, in effect, find pages that meet these criteria:

Contain the words digital video editing together

Also contain somewhere on the page the words Software and Macintosh

Do not contain the words PC, broadcasting, or engineering

When we tried this search with Alta Vista digital video editing returned just over a thousand sites and the first one hundred are displayed. Again, we can narrow the search by specifying that digital video editing and software have to be together. If we make only that change, removing the plus sign after the second quote and placing a quote after software, the search returns only 15 pages. That’s a number that lets you look at every one of the pages if you wish.

You can see the importance of understanding something about your search topic to enable you to design the most efficient searches. If you are starting with a completely new topic or one that seems to give you
little inspiration about how to construct a search, you might try one of the hierarchical sites that let you browse through menus to locate the information you want.

## Browsing the Web

Among the most popular browsing sites is Yahoo! (see logo in Figure 17-18). Go there by entering the site's URL in the Location or Address field of your browser:

www.yahoo.com

You'll see a screen similar to the one in Figure 17-19. This is a hierarchical menu tree that lets you step from topic to topic to topic until you find a specific site or page you want to study. The numbers beside each menu item shows how many sites are stacked beneath this entry. As you click on links, Yahoo! displays the path from the home page to the current page.

For example, suppose you choose Entertainment from the opening Yahoo! screen, then pick Movies and Films from the next menu. From this third screen you choose Reviews. Your display will list the path to the current page displayed at the top:

Top: Entertainment: Movies and Films: Reviews
There are many more hyperlinks to additional pages that further refine the information displayed. Note, too, that at the top of each Yahoo! screen is a search field that lets you choose an electronic search rather than continue to browse the menus. You can choose to search the entire Web or just the section currently displayed (reviews, in this example).

**Printing and Saving Web Pages**

You can print displayed pages with the File Print menu sequence on your browser. If you want to save a displayed page to disk, use File Save As and provide a folder and file name.

---

**More**

Many Web pages include photographs and other images. You can store these images separately to your hard drive by clicking and holding on the image. Choose Save As from the pop-up menu. Again, provide a folder and file name, and the image will be stored.

---

**Other Navigation Tips**

Although each browser and even each version of the same browser operates slightly differently, there are some general features you might want to try. For example, you can store the URLs for the sites you visit so you can return to a location easily without having to remember a complicated address or redoing a search. Netscape calls these stored addresses Bookmarks and Microsoft calls them Favorites.

To store a site in Explorer, display the site, and select Add Page to Favorites under the Favorites menu. To store a site in Navigator, you select Add Bookmark from the Bookmarks menu. You can also view a list of sites visited during the current session. In Explorer, simply look under the Go menu and find a list similar to the one in Figure 17-20. Click on the site to which you want to return, and it will appear quickly.
In Netscape Navigator, head for the Go menu as well.

**Using Other Internet Applications**

There certainly is more to the Internet than just email and the Web, but you'd never guess it from all of the hype. Those two buzz words are about all you ever hear. Quickly, here are some other things you can do on the Internet. Feel free to use your new-found skills with the search engines to find more information. A good site to start at is www.tidbits.com. This site is dedicated solely to your Mac and the Internet. You can usually find a link there to the latest Mac-based Internet software.

Any of this software will work just like your browser or email client. First, you connect to the Internet, then you fire them up. Some applications thrive on high-bandwidth dedicated connections, like those you may have in your office. Other applications work on a much more modest connection. You can browse other forms of information, connect to remote machines and much, much more.

**Usenet News**

This is the place to be for timely information on the Internet. It is also the place to be for obscenity, nonsense, and stale innuendo. You have to
know where and what to look for to sort the wheat from the chaff. There are thousands of individual discussions taking place in a corner of the Internet called Usenet. Typically these discussions, called newsgroups, have a logical hierarchy. You'll want to peek into the comp.sys.mac groups for sure, but there are many others. To get news, you launch an application that will read news and has access to a news server. Your ISP will usually supply one.

A popular newsreader for the Mac is Newswatcher. There are several versions of this program out there. The actual programming source code is publicly available, so several variants exist. You can combine the various newsgroups into sets by dragging them to windows like the one in Figure 17-21. This window shows a few of the 327 different Macintosh-related newsgroups it contains. Double-click on a newsgroup and you will be presented with a list of the messages it contains. Like email, you can read them and reply back to the group if you like. Thousands of people can read your message. Get a copy of Newswatcher at no cost from http://www.santafe.edu/~smfr/mtnw.

![Figure 17-21: News Groups](image)
Telnet

Once upon a time the Internet was used primarily to connect to distant mainframes around the world and use their resources. Telnet is a holdover from that era, and there are still things you can do with it. For example, if your ISP offers Shell access, then you can actually log onto their computer as shown in Figure 17-22. This can be helpful when putting up a website or just to provide quick access to other resources. You can teach yourself UNIX!

Another area where Telnet still thrives is in MUDs or Multi-User Dungeons or Multi-User Domains. These virtual worlds are a lot like Infocom's old text-based adventures. You type your commands, slay monsters, and generally run amok. Check out http://www.mudconnector.com/ for more information on them. Some people just pick one to hang out on when they are free. They become more social event than game in that respect. There are even MUDs used for teaching and education.
Chat

There are dozens of ways to talk to other people in real-time on the Internet. The oldest and most traditional way is to type messages back and forth to each other on IRC or Internet Relay Chat. There are several Mac clients out there for this sort of thing from IRCle to Homer. You can also Telnet into a UNIX shell and get to IRC the old-fashioned way if you like. Internet telephony promises to make this sort of thing obsolete, but the bandwidth isn't there to support everyone actually talking yet, so until then, they type.

These chat areas are a lot like the old party-line telephone systems and understanding everyone typing at the same time can be hard. It just gets confusing. A real advance on this technology is The Palace, shown in Figure 17-23. With The Palace you can have little graphic icons for yourself. You can move from room to room just by clicking. It gets very real and can create a genuine sense of place that many other chat areas fail to provide.

Figure 17-23: The Palace
Many More

There are even more Internet utilities and software than we can list here. You have live video conferencing built into Netscape and Explorer. You have older CU-SeeMe for video conferences. You have the amazing news service from www.pointcast.com. There are weather packages that just download satellite weather data for you and ICQ software to spot your friends when they are online. Do a little surfing and you'll see what we mean. The landscape is changing everyday.
TWO INTERESTING TECHNICAL DEVELOPMENTS SOME 10 YEARS apart have contributed significantly to a change in what we do with our Macs and how well we do it. The first event was a series of software releases in 1985 that brought fairly sophisticated desktop publishing capabilities to the Mac desktop (see following section for details). The second event was the opening of the World Wide Web on the Internet with the introduction of graphical, user-friendly browsers in late 1994 and 1995.

The first event put the power of formatting the written word into the hands of just about anybody with a little money and a willingness to learn some basic computer techniques. The second event gave us the missing link to true publishing: distribution.

In this chapter we'll introduce you to desktop publishing on the Mac and show you the basics of designing for the World Wide Web. See Chapter 17 for more information on using the Internet and the World Wide Web.

Page Layout on the Mac

In 1985 Adobe Systems put its PostScript description language onto ROM, Apple adopted Adobe's technology for its first laser printers, and Aldus Corporation introduced PageMaker. Desktop Publishing was born on the Mac. High-end publishing was no longer shrouded in rubber
Anyone with a Mac and the right program could create stunning newsletters and booklength documents, just like this one. But what is the right program?

It all comes down to what will do the job. All of the layout programs on the market today have the same basic tools and functions, so the makers have entered a feature war, each constantly one-upping the other, trying to draw the user away from the competition. In the face of this fierce competition, you can take control by making a list of the things you need to accomplish in your document and match that list to the programs you are considering.

By far the three most popular layout programs among professionals are Adobe PageMaker, QuarkXPress, and Adobe FrameMaker. All three have the same basic features, but PageMaker and QuarkXPress are the top contenders for the industry standard.

The Basics of Page Layout

Page layout is the process of putting text and graphics into a document while maintaining a consistent style throughout. That can be accomplished with any layout program, a little time, and lots of patience. Generally you start with a blank page like the one in Quark, shown in Figure 18-1. You use this page like a canvas to create your document. For larger documents, such as a book, you create a master page that contains all of the basic layout and

Figure 18-1: Typical Quark XPress Page
formatting information about your document. This greatly streamlines the layout process because you establish the master, and its formatting applies throughout the document.

The Quark XPress tools shown in Figure 18-2 are used to flow the document. You can place boxes for text and boxes for pictures on the page as shown in Figure 18-3. Using settings such as font size and leading, you create the look for the text. Leading is the total space used by the text and the space between the lines. You also tell Quark what to do with the pictures. You can make them larger or smaller and control a variety of settings including the runaround, the distance between the text and any graphics elements on the page.

The real power of Quark and other packages like it is the versatility it gives a designer to pull back and see the overall flow of a document, as shown in Figure 18-4. The lines denote the flow of text from box to box throughout the document.

Figure 18-2: Tool Bar

You let us in a sunny Friday in May.

Working for our local AM news station, I spent the day reading your description as a John Doe found in the street. I never connected my friend with yet another urban tragedy to be read over the air. You were “J.J.” to me, a man with a joyful, beer-like compassion for everyone around you, not just another body to be identified. I finally got to the hospital at 6:02 PM. You died at 5:53.

It rained that Wednesday and several hundred said their last goodbyes to you under gray drizzle. You were loved by hundreds of people around the world and they came to Knoxville until the papers were filled. We were lucky to be touched by your love of movies, your filmmaking, and your generosity. We have been inspired to greater things by your spirit and reminded of a cruel lesson by your death.

The time we have here is offered to us; things deferred until tomorrow may never come to pass.

We miss you.

J. J. Johnson Endowed Memorial Scholarship
Knoxville College • 901 College Street • Knoxville, Tennessee 37921

Figure 18-3: Text and Picture Boxes
PageMaker works in basically the same way. The main differences between these two packages are in the way they handle text and pictures. Both deal with document flow, but PageMaker tends to be a little bit better about resizing boxes. In Quark you have to resize two separate objects. However, separate text boxes earn Quark high marks in its text-handling features.

Web Page Design

Closely related to page layout, Web page design deals with pages on your screen, not paper. When Web page design started, it more closely resembled programming than traditional layout. Every command for the Web page had to be written in its own cryptic language. Luckily, the tools have gotten better and Web design has become a realm for designers, not just programmers.

What Is the Web?

A lot of people are under the impression that the Internet is actually the Web. However, the Web is just a part of the Internet, albeit the most visual part. What makes up the Web is several million documents linked together into a huge, logical cable network. Notice we said logical. Whereas the Internet is the physical linking of computers and computer networks into a global network, the Web is the data that resides on this
network. Linking of data over the Web is accomplished with *Hypertext Markup Language*, or *HTML*. HTML is a cross-platform computer language, but it's not like most other languages. Conventional programming languages, called *procedural languages*, follow set paths, somewhat like a flow chart, where certain events cause certain results. HTML is more like nonprocedural or object-oriented languages that can follow more flexible instruction paths.

HTML is an interpretive language, which means that the program instructions are stored in a plain-text format and are decoded (interpreted) by applications that understand HTML each time the instructions are encountered. This design helps fulfill the cross-platform design objective and makes it relatively easy to modify an HTML program. Once even a simple HTML program is finished, the result is text, images, movies, sounds—you name it—put together to form an entertaining site on the Web (see Figure 18-4).

![Figure 18-4: www.riddler.com](image-url)
Making a Web Page

There are several ways to make a Web page. Since all HTML documents are composed of plain-text program instructions, any word processor or text editor could be used as an HTML editor. In fact, before high-level, graphical programs became readily available, the most popular development tool among professional Web page designers was Vi (for Visual editor), an arcane, command-oriented, UNIX-based text editor. Since most early Web sites were hosted on UNIX servers, this is really logical. The major problem with developing Web pages in plain text is that you have to know HTML as a programming language.

For most of us, thankfully, there is a better way. Many companies now offer dedicated Web design programs or Web editors, most of which work like page layout programs. They let you plug in the text and images where you want them. But the major drawback is that they shield you from the HTML. Claris Home Page and Adobe Pagemill, for example, work this way. You will find a lot of similarity among the various Web page development packages, since the Web itself is so well defined. The differences are in user interface and how individual program elements are implemented.

Adobe Pagemill

Pagemill was the first Web editor for the Mac. It offered what no other editor did at the time, drag-and-drop. For example, to put a picture on a Web page you are designing, just plop it in. Text will wrap around the image automatically. In addition, with Pagemill you can change the parameters of an image before or after you add it to the page under development.

Adobe hasn’t stood still in this market niche, and today’s Pagemill is a complete page design solution. You can set everything visually or from a menu and never even see the HTML code if you don’t want to.
Claris Home Page

Claris HomePage is the same as Pagemill in the sense that you no longer need to know HTML, but it offers several powerful and useful features for page design. You can view pages as the raw HTML code that makes them up or in a visual, drag-and-drop mode, or you can preview them in your favorite browser. Figure 18-6 shows you a typical page under construction. Notice the floating windows for adjusting your images and tables. Almost any Web page variable from the title of the page to the size of dividers between cells in your tables has its own menu setting someplace.

BBEdit

BBEdit from Bare Bones Software tends to be a favorite with the diehard HTML crowd because of its deep roots in the world of code. At its core, BBEdit is a simple text editor tweaked for writing computer programs. You decide what functionality to add by installing plug-ins to the main program. For Web design, there are dozens of plug-ins that include shortcuts for all of the major HTML commands and functions.

Other applications

There are dozens of other Web development applications, such as Microsoft's FrontPage and shareware toolkits such as Web Weaver. Generally the smaller design packages may be adequate for your needs, but the larger ones offer the full suite of bells and whistles. Microsoft FrontPage, for example, lets you organize your Web site and generates "To-Do" lists of the links and images to be completed. As you would expect, when you pay more for a package it usually offers more.

Your Mac was designed to publish, whether it is in print, multimedia, the Web, or as yet undreamed of technologies. See www.media.apple.com for a wide range of Mac publishing environments.
Online resources
Of course, the Web itself is the place to learn about the Web. Try these resources and URLs for your Web page design needs:

http://werbach.com/barebones/
This site offers just what it says, a bare-bones introduction to page design. It also offers pointers to more resources and supports several languages including even Chinese and Dutch. This is definitely a good place to start.

http://www.stars.com/
This is a resource of resources with pointers to thousands of other sites dealing with HTML and World Wide Web development.

http://applenet.apple.com/
For the latest links and Internet news direct from Apple, try this link. There is a lot of Mac-specific design information here, making it a great starting point.
graphics

TO MANY USERS MAC SAYS GRAPHICS. INDEED, THE MAC WAS built on the foundation of a graphical user interface and easy access to graphics computing elements. In fact, we have become so accustomed to working in a graphical environment on the Mac that we've probably lost sight of or never considered what it takes to manage these graphics files.

In this chapter we'll discuss graphics file formats and the programs you use to create and manipulate them. We'll also look at the tools you can add to your system to make it more of a graphics powerhouse.

Graphics Programs

What is a graphic program? As Mac hardware and software get more sophisticated, it is more difficult to differentiate graphics programs from any other. Not that long ago graphics programs were clearly segregated from everything else. You had one set of programs that managed text or numbers and another set of programs that you used for managing pictures: drawings, photographs, clipart.

Today even your word processor probably includes a drawing program and you may be able to convert information in a word processing document to World Wide Web format—including drawings. Low-cost graphics animation utilities are available for Web development or for use on your corporate intranet, and the cost of truly professional drawing and photographic manipulation programs has fallen drastically.
The point is, if you are using a Mac very much at all, chances are you will be exposed to one or more graphics programs rather sooner than later.

**Paint Programs**

The first major class of graphic applications are the paint programs. These range from simple painting tools to massive photographic image editors. Computer times have certainly changed. Unlike the situation just a few years ago, today anybody who wants to can afford to work with digitized photographs, and the process is fairly easy to learn. There still are professional considerations of skill and experience that keep many of us from turning out publication-quality work. But you can have your snapshots digitized when you send the film off from the drugstore or from many mail-order-processing companies. Frequently your first order will include photo editing and manipulating software. If it doesn’t, you can purchase software to do the job relatively inexpensively.

Why would you want to digitize photographs? “For the fun of it” is the simple, basic answer. If you haven’t sent someone an electronic mail message with the pictures of your birthday party or a close-up of your dog, you’re missing a lot of fun. If you haven’t tried your hand at designing a greeting card that includes your own photography, you aren’t using your Mac to its fullest.

Besides, the cost is low enough and the readily available software good enough that you should consider including photography in corporate reports, training documents, or letters to friends and family.

Paint programs work on the bitmap model. For every pixel in an image, there is a single “dot” of paint. This is actually just a numeric value that says, “Hey, I’m a bright greenish-blue dot!” Together, a few thousand of these dots can make up a photograph of your Aunt Mary or a painting of a giant flesh-eating dinosaur out of a forgotten age. The pixels don’t care.
All of the graphics you download on the Web are paint files. These are generally stored in JPEG or GIF format for transport over the Internet. Look at the picture in Figure 19-1. It looks fine at one resolution, but as you blow it up, it *pixelates*. Another way of saying this is that it sprouts *jaggies*, those little square blocks around the edges. Each of those is a pixel.

![Pixelation](image)

*Figure 19-1: Pixelation*

You can cut-and-paste sections of paint programs at will. Your application just grabs the individual dots in the area you suggest. There tend to be more interchange formats for paint programs, as well.

**Drawing Programs**

Drawing programs are different from paint programs. Instead of placing dots of color on a page, you use mathematic formulas to produce clean, smooth shapes at any resolution. Don't worry, the math here is well hidden, but it's there. This means that your computer treats drawing information differently. You can't just cut-and-paste a corner of the document. The document is made up of objects. Typically the files from draw and paint programs are not easily interchanged. There are two grand divisions in drawing applications on the Macintosh.
On the low end are the QuickDraw applications and at the high end are the PostScript drawing programs. The QuickDraw applications use the Mac's display-and-drawing language to create documents. These tend to be fairly Mac-centric but are fine for simple work. You can print to any printer, but for output to high-end PostScript machines, you are better off working in the family of drawing applications listed. The powerful PostScript applications use the powerful PostScript language to produce precision artwork. See Chapter 10—Printing for more on this topic.

ClarisWorks contains a good QuickDraw drawing application that can illustrate a few simple drawing principles. First, generally you create shapes like the circle in Figure 19-2 in any draw program and build up complex images as a collection of shapes. Since this circle is just a mathematical representation of a circle, we can make it as big as we like and not experience those familiar jaggies. Just look at the smooth curve in Figure 19-3. Look for other simpler drawing programs to be of the QuickDraw type as well.

You won't use these basic utilities for serious artistic or publication drawings, but you can use them for useful tasks. Simple drawing programs let you create basic line drawings, organizational charts, and the like.
Simple drawing programs are a little like your favorite coat or special pair of gloves. Know how you just naturally gravitate toward those special garments, eschewing newer, even better, choices? You’ll find the same thing with your drawing application. The one you know is the one you’ll use, even though you may have newer and better choices right on your hard drive.

Don’t close your mind to enhanced, newer utilities, but don’t feel obligated to upgrade or learn something new if what you have is doing the job for you either. At the end of this chapter, we have summarized some of the popular Mac-based painting and drawing packages. These are ones you’ll use for simple tasks, for personal drawings, to illustrate a corporate report, and so on.

There are times when the basics aren’t good enough. If you have your creative eye focused on doing some really high-end drawings for work or fun, then you’ll need more drawing power than we listed in the previous section. There are really two big contenders for this market: Adobe Illustrator and Macromedia FreeHand, but you aren’t limited to these choices.

Animation Programs

The animation category is really a crossover category. You’ll find some animation software discussed in Chapter 21—Multimedia, Movies, and Sound and in Chapter 17—Working the Internet. But there also are animation packages for more general use as well as for highly specialized applications. We’ll cover some of those in this section.

When you think of animation do you think first of Mickey Mouse and other Disney icons? Sure you do. But in today’s Mac market animation means more than traditional cartoons. For example, World Wide Web pages today frequently use animated GIF graphics files. This is pretty simple animation, but it can add motion—or the sense of motion—to your Web page or Intranet site.
Other types of animation include recording keystrokes and mouse movements to play back as part of online documentation, education, or training. Traditional animation—a la Disney—is also used on Macs, of course, and can be part of a multimedia production.

On the World Wide Web, animated GIF files have created a renewed demand for small animation files. You can use applications as simple as GIF Builder or as complex as Macromedia’s Director to create animated GIFs. The other use for animation is to add pizzazz to presentations or to flesh out multimedia presentations. You can even do 3D animation on the high-end and produce broadcast-quality special effects.

The Applications

There are many, many, MANY drawing and paint programs out there, and this is just a sampling of what is available. Be sure to search the Internet and browse some catalogs for even more applications. The Mac is still the number-one machine for producing graphics and illustrations, and new tools are created all the time.

Draw Programs

**Freehand:** Macromedia - [www.macromedia.com](http://www.macromedia.com) - Vector-drawing package with many high-end enhancements. Supports animations and vector morphs and will export data to Macromedia Flash, a Web animation tool.

**CorelDraw:** Corel - [www.corel.com](http://www.corel.com) - Integrated 32-bit drawing and word processing package. Includes applications for illustration, photo-editing, bitmap and texture creation, 3D rendering, and multimedia file management.

**Illustrator:** Adobe - [www.adobe.com](http://www.adobe.com) - This is one of the top illustration applications on the market today. It is a PostScript drawing program of the highest quality.

**Canvas:** Deneba - [www.deneba.com](http://www.deneba.com) - More than a drawing tool, Canvas
can help you create newsletters and other page designs. Promoted as "all-in-one solution for technical illustration, vector drawing, bitmap painting and editing, page layout, and presentations."


3D Design

DenebaCAD: Deneba - www.deneba.com - Integrated architectural and engineering drafting and design program. Integrates 2D drafting, 3D modeling, and 3D rendering in one application.

Ray Dream: Fractal Design - www.fractal.com Full-featured, 3D drawing and artist's package. 3D modeling and scene design.

Touch-3D: Lundstrom Design - http://www.algonet.se/~ludesign/ - 3D-modeling program designed for scale models, concept design, mock-ups, quick prototyping, architectural models, sheet-metal work, production preparation and optimization, and other drawing and design applications.

Paint

Photoshop: Adobe - www.adobe.com - Photo design-and-production tool. Use on photographs to create, paint, correct, and retouch.

PhotoDelux: Adobe - www.adobe.com - Easily modify and personalize your own photos. Includes special effects and templates for creating calendars, cards, fliers, and more. EasyPhoto Organizer lets you create albums or galleries of photos for easy storage and retrieval.

ArtWorks: Deneba - www.deneba.com - 24-bit color painting, precision drawing. Includes 500 fonts and 8,000 clip-art images on CD.

Mac painting tool. Targeted for artists, designers, and painters. Broad range of drawing tools and features.

**Animation**


**PICTs to Movie**: Shareware - ftp://zippy.nimh.nih.gov/pub/nih-image/programs. Turn a sequence of PICT files into a QuickTime movie with a choice of colors, frame rate, compression system, and quality.

**Sparkle**: Shareware - ftp://zippy.nimh.nih.gov/pub/nih-image/programs MPEG and Quicktime animation player; also converts between QuickTime and MPEG formats.

**Macromedia Director**: Macromedia - www.macromedia.com - Using Director to create animated GIFs is a bit like using the Space Shuttle to fetch milk and bread. It is just plain overkill, but what pleasantly useful overkill it is. You can also use Director to churn out multimedia and Shockwave Internet information as well.

**Graphics Files Reference**

We discussed basic graphics file formats in the previous sections as they related to the programs and graphics material covered. In this section you'll find a simple, quick reference of common graphics file types. This will help you understand what programs you need to manage the files you encounter on your Mac, on the Internet, or in programs you may be using.

As program complexity grows, file diversity and complexity grow. However, for most uses we can divide basic graphic files into two types: vector (paint programs) and bitmapped, or raster (draw programs). A vector file describes its elements in terms of end points and lines (vectors). A bitmapped file describes its elements in terms of points of lights.
or pixels that are turned on and off. Bitmapped files are further defined by bit depth, or how many bits of data are used to describe the color information in each pixel. A bitmapped file that is 1-bit deep is a monochrome file. A file with 8 bits of data can define 256 colors \((2^8 = 256)\), and a 24-bit file can reproduce images with a color depth of 16 million colors \((2^{24} = 16,777,216)\).

Most graphic file formats use some form of compression to reduce the amount of disk space required to store the file. Some compression schemes reproduce color and image detail faithfully, others are less true to the original. A format that can store and reproduce an image essentially the same as the original is called a lossless format. One that can’t store the data as well is called a lossy format. One of the main problems with using a lossy format is that the effects are cumulative. Each time you save a file in a lossy format, chances are you will lose more data.

It would be impossible to cover every possible file format that you are likely to encounter, but the list will go a long way to give you the information you need to make Mac-based graphics easier to understand and to use.

**PostScript (EPS):** Interpretative image format. Good for cross-platform applications for text and graphics. Can include embedded color image. Screen and printer versions in use. Supported by most page-layout and illustration programs.

**GIF:** Graphics Interchange Format. Developed by CompuServe as an online file storage and file interchange format for defining generalized color raster images. GIF does well on images with only a few distinct colors, such as line drawings and simple cartoons. Stores 8 bits of color information per pixel (256 or fewer colors). Use JPEG for photographs and other deep-detail images.

**TIFF:** Tagged Image File Format. Defines grayscale and color images with relatively high definition. Multiple TIFF formats exist. Bit-depth (image quality) and compression
or no compression are among the possible TIFF file options. Frequently used in publishing where good image reproduction is important. Can generate large data files but supports wide range of image resolutions.

**JPEG:** Joint Photographic Experts Group format. Compression (up to 20:1) format for full-color or grayscale images. Works best with photographs and other images with a lot of detail. Not particularly good for text data. Fairly lossy format. May not reproduce data completely. Stores 24 bits of color information per pixel (16 million colors).

**MPEG:** Compressed Motion Video Storage format. Motion version of JPEG.

**JFIF:** JPEG File Interchange Format. Used to enable JPEG file transfer between various computer platforms and applications. Mac, PC, and UNIX compatible.

**BMP:** PC PaintBrush Bitmapped file format originally designed for the PC, now found also on the Mac. Multiple formats up to 24 bits of color depth but with a fixed pallet, which could mean color changes when imported into a Mac application.

**PCX:** PC PaintBrush Popular raster format that is supported by a wide variety of applications. Various versions up to 24 bits of color.

**PICT:** MacDraw Object-oriented vector format. Files consist of separate graphics objects such as lines, arcs, ovals, or rectangles, which you can independently edit, size, move, or color. Also can store bitmapped graphics. Color depth up to 24 bits and can use various compression algorithms such as JPEG. Good for general Mac applications but not for desktop publishing.
**QuickTime:** Apple
Versatile format for motion video and sound.

**TGA (Targa):** Truevision
High-resolution image and ray-tracing format. 24-bit color format. Most common on PC but also used on Mac. Common with video industry applications.

**HPCD:** Kodak Photo CD
24-bit color image. Mainly used to store photographic images on CD-ROM. The standard calls for four image sizes to be stored for each image.

**MAC:** MacPaint
1-bit (monochrome) file format. Supports up to 576 pixels by 720 lines.

**WPG:** WordPerfect Graphic File
Bitmapped, line art, and vector graphics files. WP 5.1 format. Older.

### Other Graphics Stuff

Graphics on any computer platform can be relatively simple—if you’re just doing some basic drawings for your word processing files or corporate reports—or painfully complex—if you’re sharing information on the Internet or working with several hardware platforms in a development environment.

There are some programs and resources that can help you get over these obstacles. We’ll discuss a few of them in this section. As usual, to solve a particularly sticky problem you’ll need to search the World Wide Web, read related journals, ask your friends and colleagues, and in general be creative and resourceful. There’s no one answer to problems like these.
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Look for these graphic programs.

**Graphic Converter:** Shareware - Thorsten Lemke -
www.goldinc.com/Lemke/gc.html
Converts Mac graphics files to many formats. Also helps you manipulate images, including auto crop, color table editing, scaling, rotation, and filtering.

**JPEGView:** Shareware - ftp://zippy.nimh.nih.gov/pub/nih-image/programs
JPEG viewer; also supports PICT, GIF, TIFF, BMP, MacPaint, and Startup Screen files.

**Conversions Plus!** Dataviz Software - www.uslink.net/~smrsoft/conv.htm
Flexible file conversion program designed to convert Macintosh files to an IBM-PC format. Allows the IBM-PC to read a Mac disk and converts many Mac file formats into PC-compatible format.

**Graphics Hardware**

In addition to software, hardware is a part of the Mac graphics experience. If you are into creating your own graphics on the Mac, you may also want to consider some additional hardware. For simple drawing, basic corporate reports, and presentations, the mouse and keyboard that came with your Mac is good enough for input, and you probably won’t need anything special for output. A basic laser printer or color ink jet will do just fine.

For more serious applications such as photo retouching in a high-end program such as Photoshop or drawing with CorelDraw, you may want to consider a digital tablet for input and a high-resolution color printer for output. For information on printer technology, refer to Chapter 10—Printing. For some information on using graphics tablets with your Mac, read on.
Chapter 19: Graphics

Graphics Tablets

We discuss installing drawing tables in Chapter 15. It is basically a simple process that includes plugging in a cable to your serial port or into the ADB bus, then installing some software. Then you have access to the features of your particular tablet.

A graphics tablet lets you navigate your Mac software, draw images, and edit drawings or photographs using a pen-like stylus on a flat pad. If you wonder how this might work relative to using a mouse for graphics tasks, try this little test. Open MacPaint with a new, blank file open. Choose the small pen tool and use the mouse to sign your name in the middle of the screen. Do it just once. You have to live with whatever you get.

Next, take a blank piece of paper and place it flat on your desk. Use a pencil or pen and sign your name again, right in the middle of the page. Are the two the same? Was it as easy to sign your name with the mouse as it was with the pen or pencil? We know the answer to these questions before you answer. You do too, don’t you?

Early drawing tablets were pretty basic, but today’s products are quite sophisticated. High-end tablets such as Wacom’s PL-300, include an LCD screen display and a stylus that is pressure-sensitive. That means the harder you press on the tablet as you draw, the darker the line, just like a regular pen or pencil. In fact, this tablet recognizes 254 levels of pressure to help you produce high-quality drawing and shading results. This particular example is a costly one, in the $2,600 range, but if your

Figure 19-4: Wacom artPad II
job involves graphics work with a Mac, this level of versatility is probably worth the price.

The advantages of the tablet for graphic professionals are obvious. But if you do even a moderate amount of graphic design, then you should consider a tablet. They don’t all cost over $2,000. The Wacom artPad II, shown in Figure 19-4, retails for under $200, for example. You can find tablets from about 4- by 5-inches up to 18- by 25-inches or even larger.

**Scanners**

Another input device that is useful for graphics work is a scanner. Scanners let you copy printed material—a photograph, a page from a book or magazine, a poster, or a drawing—into your computer. Scanners are about as varied as printers, so covering every aspect of this technology in a small portion of this book is impossible. However, there are a few considerations you should be aware of as you investigate scanner hardware.

A scanner shines light on the source document and captures the reflections, converting the image into dots that are rendered in black-and-white, shades of gray, or color tones. The level of detail the scanner records is measured in dots per inch (dpi). The higher the dpi, the greater the resolution of the captured image and the larger the resulting file. Color scanning also produces larger files than black-and-white or grayscale scanning.

Consider also color depth. We discussed color depth earlier in this chapter. If your needs are for high-resolution color output from your scanned images, then buy a scanner with enough hardware resolution to meet your needs, but also make sure it supports the color depth you need. Remember that 24-bit color, sometimes called true color, should give excellent results, better than a 16-bit scanner. An older scanner that can capture only 8 or 12 bits of color data won’t give you very good color results.
multimedia, movies, & sound

MULTIMEDIA, LIKE GRAPHICS IN GENERAL, IS A STRONG AREA for the Macintosh, an area that Apple and Mac programmers have pioneered. Multimedia software and applications have been around for years, but recent hardware developments—faster processors, cheaper memory, high-capacity, low-cost storage—have made it easier for more of us to experience this interesting aspect of desktop computing. In addition, various national organizations have made strong efforts to develop standards for multimedia hardware and software, making it easier to define the medium and also to develop software and applications.

In this chapter we will provide some background on multimedia on the Mac and introduce you to the key multimedia applications you can use.

What makes the Mac such a strong multimedia machine? First, there is the much maligned “ease of use” aspect. Though Bill Gates might want the consumer to believe that a Windows system is every bit as easy to use as a Mac OS system, study after study proves him wrong. Macs have more up time and higher marks for productivity. This alone makes them a pretty good choice. Next, Macs have strong cross-platform support. They are a great platform for cross-platform product development. Macs can easily burn cross-platform CDs, and Macs can read PC-formatted disks, making it easier to import data. Those facts, coupled with the Mac's wide selection of graphic and media tools, have made it an industry leader in this market.
Multimedia Defined

A definition of multimedia is at once easy and difficult. If you keep your focus general, then multimedia computing could be defined simply as the merging of video, audio, graphics, and text in a multilevel, interactive computer-based production. Those key words—audio, video, multilevel, and interactive—are taken from a definition published by IBM and others in the early 1990s when multimedia was just beginning to rise in popularity.

The key idea at the time among all computer manufacturers and software producers was the concept of interactivity. Multimedia computing may include graphics and sound, it frequently includes video and animation, but it certainly is interactive. Multimedia computing doesn’t mean sit by and watch something happen, it means put your hands on the keyboard and the mouse and make it happen.

What is the difficult part of the multimedia definition? The difficulty comes when we try to categorize specific software or applications as multimedia or not multimedia, especially in today’s merging market when virtually every program contains some multimedia features.

Is Microsoft Word, one of the most popular Macintosh word processing programs, a multimedia application? No? Well, consider that you can embed in your Word documents motion video segments, sound announcements or sound effects, and animation. Now is it multimedia?

What about a database built in FileMaker Pro? A database management system isn’t a multimedia program? Well, the new FileMaker Pro includes TCP/IP support and graphics elements that lets you build direct Web page access through a database application. This is fully Web compliant, and since the Web supports all elements we have just defined as multimedia, then is FileMaker Pro a multimedia program?

See the dilemma?
What is really happening in today's marketplace is that multimedia has become so much a part of our everyday personal and business computing experience that any attempt to separate multimedia from any other forms of computing isn't valid. Some applications and programs are more multimedia than others, to be sure, but it is rare today for any serious business or personal Mac-based program to be completely devoid of multimedia support.

**Multimedia Standards**

As multimedia computer platforms and software applications developed, program writers and hardware manufacturers were pretty much on their own to produce product. Early on we saw a broad, disparate collection of so-called multimedia platforms. In the late 1980s IBM, Microsoft, and Tandy jointly formed the Multimedia Marketing Council, a body designed to establish hardware and software standards for this growing area of personal computing.

From the early 1990s until mid-1997 the Interactive Multimedia Association was an active force in helping to define standards for multimedia hardware and software. This organization disbanded and threw its resources in with the Software Publishers Association, potentially a strong move for the industry by further reducing segmentation in standards discussions.

Apple wasn't formally part of this organization at the time, and the specifications and requirements established then are pretty much out of date now. The Macintosh was already considered a multimedia development platform, and many Macintosh machines met the MPC standards of the day anyway. Today virtually every computer you buy—Macintosh or PC—meets or exceeds the minimal MPC standards.

If you own a reasonably modern Mac you need not worry about meeting or exceeding suggested multimedia standards. However, you can see from the standards list what it takes to support today's multime-
dia applications: sound and video support, plus high-density storage in the form of hard disks and CD-ROMs.

The Macintosh is still a major force in the multimedia-development world and is seen by many developers as the right mix for cross-platform products. Dataquest Corporation, for example, estimated in late 1997 that about 63 percent of all multimedia development was being done on Macintosh OS platforms. The resultant applications might be distributed on Macintosh, PC, or other platforms, according to Dataquest.

**Multimedia Application Types and Programs**

Specifying multimedia application types, putting on paper a definitive list of multimedia classes, is as difficult as defining multimedia in the first place. The marketplace is changing and the sociology of computing is changing, but we can probably agree on some interesting examples of how multimedia technology is being used.

In this section we want to open your eyes to the possibilities of multimedia through some examples. We'll discuss two general classes of multimedia: programs and applications. A program is software you or someone else uses to develop applications. An application is the finished product that results from work with a program. Multimedia applications include a graphical inventory or marketing database, an educational presentation, an interactive catalog, and a graphics-based game that includes video segments.

**Applications**

Consider these application examples.

* A visitor approaches a kiosk in the visitor center of a state or national park. By touching the screen a few times the visitor displays a map of the area, chooses a point of interest, views a brief video of
various things to see, views a list of charges and options, and finally prints a map and check list to help with the visit.

Computer-driven kiosks are becoming a popular multimedia application for public and commercial installations. Shopping malls and department stores can use this technology to help customers locate a product or service. Colleges and universities are using it to help students and visitors find their way around campus or locate specific school resources and services.

* An appliance-repair technician opens a parts folder for a particular product. He selects from a 3D picture of the appliance the area he is repairing. The picture explodes to show internal and external parts. He clicks on the module that is broken and chooses a replacement part. The program displays another 3D view, this time of the part itself, and shows part number, wholesale and retail costs, and notes what additional submodules are required for this part to function properly. Satisfied that the selection is correct, he clicks on an order box and the replacement part is ordered automatically from an online connection.

Multimedia-based shopping services are available on CD-ROM and via the Internet. Electronic catalogues for consumer products, replacement and repair parts, medicines, electronics, and more, are readily available and growing in popularity. The interactive nature of these multimedia offerings is attractive to consumer and marketer alike. The potential customer can investigate a product or get help with configuration and features by answering a short survey, for example. One or more videos can show the product in use or show a brief statement from a service provider for a personal touch.

* A sales executive enters a conference room where several corporate department heads await her presentation. She plugs a laptop into a video projector and a telephone line. Then she launches a program that helps her show details of her products and services. She incorporates audio narration from her company's technical-support peo-
ple, video sequences from research and manufacturing, live Internet data, and animated graphs.

* A second grader sits before a Mac that displays a multicolored map of North America. A narrator asks the student to touch her home state. When she does, the display opens to show more details. Next she is asked to touch the town where she lives. Through a series of interactions and vocal instructions the student learns about her state and community and takes a brief quiz to show her teacher what she has learned.

Multimedia Programs

A few years ago if you wanted to produce multimedia applications you needed dedicated multimedia-development tools such as Macromedia's Director. Today Director is still considered a major player in the multimedia arena, but you also can produce meaningful multimedia applications with a broad variety of programs.

The program list in this section is by no means totally comprehensive. If your favorite program isn't here, there's no slight intended. We do, however, want to list some of the most visible applications with a little information on what they do best.

In general there are three types of multimedia programs for the Mac. Our list includes:

Read-Only or Players. Most of us use players more than any other kind of multimedia software. Multimedia players let you access multimedia material or applications without having to own a full-featured program. Players are frequently distributed free of charge over the Internet or as part of applications. Players can be stand-alone programs, or they might install as an addition to Netscape, Internet Explorer, or other programs.

Development Tools. Development tools are used to design and produce applications. As a user you may not even be aware of the tool itself...
since you are using the resultant application, the education program, the inventory tracker, the presentation, and so on. Unless you have some programming experience or are willing to learn some high-end programming techniques, you won’t be using programs in this class.

Crossover Tools. As the name implies, crossover tools lie somewhere between players and development tools. As we mentioned, development tools are generally high-end programs used by professionals in the application-development field.

Most of us who are computer users don’t use development tools. However, some development tools can be used at two levels. You can delve into the program to produce sophisticated applications, or you can use it at a more superficial level to help you produce multimedia applications. Other crossover tools are basically user tools that include multimedia features. An example is Microsoft’s PowerPoint presentation package. This program is designed for the end-user who wants to develop sales, informative, or educational computer-based presentations. You can use it to build text charts and drawings to illustrate a point. However, the latest versions of this program also let you insert sound, narration, motion video, and animation sequences. Though this program will help you build presentations using these modules, it isn’t really designed to develop the modules.

Notice also that there are open-standard applications such as QuickTime that can be used by all developers and there are proprietary products such as Macromedia Director that use technologies reserved for the company that owns the product. With Director, you have to save your files out into independent cross-platform players or special files for the Shockwave plug-in.

Multimedia originally was an at-work technology because the capabilities it presented for training and sales were great compared to the cost. Initially, however, the hardware and software required for multimedia cost too much for individual users. Now, with multimedia hardware already a part of virtually every Mac platform and the software getting
cheaper, multimedia use and development is something for everyone. For example, for a few hundred dollars you can add a CD-ROM drive to your Mac that will write CDs as well as read them. You can use relatively simple software such as Adaptec's Toast with a low-cost CD burner to record your own CDs. You could use Toast (or something like it) to combine a set of your favorite songs from various artists into a new custom music CD, for example. When you’re through, you can use the CD on a Mac or a PC, and the software supports multisession applications, which means you can record a few songs in one session, then sometime later add more songs to the mix.

Refer to the following list. We’ve included some of the popular multimedia programs and listed the type according to the previous list, the company that produces it, and a brief description. In the next section we’ll give you address and other contact information to help you reach these companies and other multimedia sources in the industry.

**Multimedia Program List**

**Apple Media Tool (AMT):** Development
By Apple
Screen-mapped user interface with a storyboard metaphor makes this high-end development tool relatively easy to use. Includes runtime player support.

**Apple Media Tool Programming Environment (AMTPE):** Development
By Apple
Object-oriented language and development framework. Offers extended features to applications developed with Apple Media Tool.

**Authorware:** Crossover
By Macromedia
Development tool targeted at trainers and educators. Designed for non-technical user.
**Digital Box Office:** Crossover
By Power Production Software
Quick-turnaround, nonscripting authoring tool. Create movies, sounds, animations, and special effects. Includes runtime player.

**Director:** Development
By Macromedia
Among the high-end development products. Used for education, training, presentation, and other multimedia applications. Strong programming, graphics, motion video support.

**GifBuilder 0.5:** Development
By Yves Piguet
GIF image animation scripting program. One of many such programs that let you animate graphics images for the Internet or Intranet applications.

**GIFmation:** Development
By Boxtop
GIF image animation.

**HyperCard:** Crossover
By Apple

**HyperStudio:** Development
By Roger Wagner Publishing
Paint, animation, and QuickTime support. Targeted at schools for educational projects.

**Marionet:** Development
By Allegiant
Programmable TCP/IP access in SuperCard/HyperCard. Also available for Macromedia Director.
**mTropolis:** Development  
By mFactory  
High-performance graphics and animations in cross-platform environment. Uses drag-and-drop interface and logic modules for ease of sharing and development.

**PowerPoint Crossover**  
By Microsoft  
Medium- to high-end presentation tool. Used for education, training, and sales. Supports many multimedia features.

### Multimedia Sources

As you study multimedia issues and learn about resources available for your Mac, you'll need some good places to start the process. In this short section we'll set you on the right path toward learning about multimedia, then you're on your own to find the information you need.

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**More**

Here's a list of the software companies mentioned earlier in this chapter. Use this list as a starting place for information and to help you learn more about the specific products in that table.

- **Allegiant Technologies Inc.:** [www.allegiant.com](http://www.allegiant.com)  
- **Apple:** [www.apple.com](http://www.apple.com)  
- **Boxtop Software Inc.:** [www.boxtopsoft.com](http://www.boxtopsoft.com)  
- **Hypnovista Software:** [www.hypno.com](http://www.hypno.com)  
- **Macromedia:** [www.macromedia.com](http://www.macromedia.com)  
- **Mfactory:** [www.mfactory.com](http://www.mfactory.com)  
- **Microsoft:** [www.microsoft.com](http://www.microsoft.com)  
- **Oracle:** [www.oracle.com](http://www.oracle.com)  
- **Power Production Software:** [www.webburst.com](http://www.webburst.com)  
- **Roger Wagner Publishing:** [www.hyperstudio.com](http://www.hyperstudio.com)  
- **Yves Pignut:** [www.gifbuilder.com](http://www.gifbuilder.com)
Manufacturers. A good place to start, of course, is the manufacturer of the software you plan to use on your Mac. Many software companies publish white papers and software descriptions that give you an excellent foundation in multimedia. Find their pages on the Internet, contact them through your local software store, write, or call. Those companies that specialize in multimedia applications are usually more than happy to share with you, a potential user, their knowledge about the technology.

**Movies and Sound**

Multimedia applications can include graphics, graphics animation, sound, motion video, charts, text, and more. Multimedia programs, the utilities you use to produce multimedia applications, normally have support for inserting these elements and may support elemental sound recording or video capture. However, conventional multimedia programs normally don’t provide sound and video editing at a high-end or professional level.

Depending on your applications, you may want to get involved in production at this level. The Macintosh is a popular audio- and video-editing platform, and there are lots of software and hardware support products to help.

**Sound Hardware**

Your Mac comes from the factory with sound hardware. The age of your machine determines the type of sound hardware you have installed. Basically, you should be able to hook a set of speakers or an amplifier to your Mac’s sound-output port and play a variety of sound files or music on your CD-ROM drive. You should also be able to connect a microphone or external sound source via the line-in port and record narration, sounds, and music. See Chapter 15 for more on adding Mac hardware.
Current multimedia standards and hardware conventions require that your sound hardware convert sound at a sampling rate of 22.05 KHz or higher. That means that converter hardware and software must capture 22,050 samples of sound every second (Hertz - Hz - is a term for cycles per second). That is the minimum for reasonable quality sound. Your CD music is recorded with a 44.1 KHz sampling rate, and your Mac is capable of recording at this level.

The higher the sampling rate, the better the audio quality, but higher sampling rates also require more storage space. You may find that for some applications that lower sampling rates, even 11.025 KHz or lower, are sufficient to produce the quality you need. Many voice-only applications, such as narration, may not suffer with lower sampling rates. If you want to play back high-quality music, on the other hand, you'll need 22.05 KHz or higher sampling rates for reasonable quality.

You can see why you need to manage sound quality for your multimedia productions. Although your Mac can record and play back sound of very good quality, you pay for quality with increased storage requirements. You can conduct the calculations yourself for any length sound segment. Estimate 172,000 bytes of storage for each second of 16-bit stereo sound at a 44.1 KHz sampling rate. At 22.05 KHz you'll need about 86,000 bytes for each second of sound, and figure on using about 43,000 bytes per second at a sampling rate of 11.025 KHz. If you record 8-bit mono sound, cut these figures in half.

<table>
<thead>
<tr>
<th>Length</th>
<th>44.1 KHz</th>
<th>22.05 KHz</th>
<th>11.025 KHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 minute</td>
<td>10.32 Mbytes</td>
<td>5.16 Mbytes</td>
<td>1.26 Mbytes</td>
</tr>
<tr>
<td>5 Minutes</td>
<td>51.6 Mbytes</td>
<td>25.8 Mbytes</td>
<td>6.3 Mbytes</td>
</tr>
<tr>
<td>15 Minutes</td>
<td>154.8 Mbytes</td>
<td>77.4 Mbytes</td>
<td>18.9 Mbytes</td>
</tr>
<tr>
<td>30 Minutes</td>
<td>309.6 Mbytes</td>
<td>154.8 Mbytes</td>
<td>37.8 Mbytes</td>
</tr>
<tr>
<td>60 Minutes</td>
<td>619.2 Mbytes</td>
<td>309.6 Mbytes</td>
<td>75.6 Mbytes</td>
</tr>
</tbody>
</table>

*Table 20-1: Sampling Rates*
Don't be surprised if you don't see these precise values when you save sound files on your Mac. Different disk drives require different amounts of storage overhead—the minimum storage required for any size file—and the format used to store the files will make a difference, too. But these values give you a good place to start budgeting storage space for your Mac sound projects.

**Sound File Formats**

When you record a sound sequence—digitizing a sound—the analog sound is sent through the Mac's sound hardware in analog format, converted to digital format, then sampled at a specified rate. This sampling process is similar to motion-picture photography.

If you want to capture to film an exact representation of an action sequence you would need to take an infinite number of individual frames. After all, time is continuous. When someone walks across a room in 10 seconds, it is a continuous event. Taking an infinite number of pictures is impractical and impossible. In reality when you capture a scene with a movie camera the camera's shutter snaps 24 pictures every second, segmenting each second of action into 24 units. When you play this sequence back on a projector the motion appears normal, even though a lot of the information associated with that scene is missing.

The same thing happens when you capture a sound sequence in digital format. You can't capture an infinite amount of information. Not practical. So you capture small pieces of the sound at regular intervals. With enough samples you can't really hear the difference between the digitized file and the real thing. When we talk about a "sampling rate" of 44.1 KHz, we mean the digitizing hardware is capturing and recording to disk 44,100 samples every second. Obviously, since time is continuous, we are missing a lot of information from the original sound, but with 44,100 samples every second you can't really hear what you're not hearing, if that makes sense. This rate was chosen through experimentation that showed that a sampling rate of at least twice the highest frequency you want to reproduce results in reasonable sound quality and repro-
duction. Since the human ear interprets sound roughly in the range of 20 Hz to 20 KHz, the standard 44.2 KHz sampling rate produces reasonably good quality.

In fact, even at sampling rates as low as 8 KHz there's enough information for you to hear all the information in recorded speech. The voice quality won't be very high, but all of the information is there. Music recorded at 8 KHz, on the other hand, sounds pretty bad.

Another popular multimedia sound format is much more efficient in terms of disk storage requirements, but it also requires more hardware support. MIDI sound (musical instrument digital interface) stores only instructions to separate sound hardware to reproduce the sound. MIDI sound is synthesized sound or digitized sound that is stored in hardware. MIDI is used often in recording studios to create instrumental accompaniment for vocalists.

Relatively low-cost MIDI hardware can store a full range of sounds for 256 or more musical instruments. These synthesized or digitized sounds are elemental, individual notes of short duration over the range of the instrument, for example. Then the MIDI control software tells the MIDI hardware which notes to play from which instruments and how long to play them. A MIDI control file can play this hardware to make it sound like a real instrument or a full orchestra. Obviously storing just the commands for turning on specific sounds in a particular sequence takes less space than storing the actual sound. With QuickTime, your Mac supports MIDI playback in a variety of applications.

There are many other audio-file formats that you may encounter in multimedia or Internet explorations. Some of these are common with workstation users—UNIX and high-end operating systems—and others were pioneered by software producers. Many of the software products listed in the next section can import and play these files and even convert them to AIFF or other formats. We won't spend space in this book trying to document every possible sound format. Just be aware that AIFF and MIDI are the most common for multimedia Mac applications.
and know that other file formats exist. A brief summary of the more common of these formats is shown in Table 20-2.

<table>
<thead>
<tr>
<th>File Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIFF</td>
<td>Macintosh digital audio. Designed by Apple. Similar to WAVE format files. Samples up to 44.1 KHz at 8- or 16-bit depth.</td>
</tr>
<tr>
<td>AU</td>
<td>Sun workstation (UNIX) audio. 8-bit, 8 KHz recording.</td>
</tr>
<tr>
<td>MIDI</td>
<td>Musical instrument digital interface</td>
</tr>
<tr>
<td>RIFF</td>
<td>Microsoft digital audio format. Superset of WAVE format.</td>
</tr>
<tr>
<td>SND</td>
<td>NeXt</td>
</tr>
<tr>
<td>TEXT</td>
<td>Headerless, raw sound files</td>
</tr>
<tr>
<td>WAVE</td>
<td>Subset of RIFF file format. Primarily PC-based files. Samples up to 44.1 KHz at 8- or 16-bit depth.</td>
</tr>
</tbody>
</table>

Table 20.2: File Format List

**Sound Software**

Your Mac is supplied with basic sound-management software along with the sound hardware. You can capture sounds with the included microphone and integrate them with your other alert sounds.

If you want to do more than this supplied software allows, you might want to consider one of the software packages described briefly below. These are mostly sound-recording and editing utilities that you can use to build professional—or near-professional—level sound files for multimedia productions. Some sound-manipulating software supports multitrack recording and editing, which lets you use layering, like the professionals, to merge various sound sources into a finished production.

As you move toward professional-level sound production on the Mac you'll need fairly high-level computing power to get the most out of the available software. A PowerPC-based Mac or one with at least a 68040 processor and 32 Mbytes of RAM should be considered the minimum configuration.
Most sound-editing software lets you record at least two tracks for stereo and you can cut, add, and mix sounds. Other features to look for include noise canceling, equalization, and special effects such as echo and expansion. The cost of this software varies widely from really inexpensive shareware to relatively expensive $500 professional programs.

**Mac Sound Software Sampler**

**Alchemy**: Passport Design
Basic sound-editing software. Supports cut, copy, paste, and mix functions and other basic editing features. RAM-only editing, so a large amount of RAM is needed for large audio files.

**Pro Tools**: Digidesign
Mac hardware and software package for professional sound editing. Supports up to 48-track recording and editing. Expensive!

**Sound Designer II**: Digidesign
Software-only, stereo recording and editing package. Supports virtual memory to edit large sound files.

**SoundHack**: Shareware - http://shoko.calarts.edu/~tre/SndHckDoc/
Play, record, import, and edit a wide range of audio files.

**Sound Machine**: Freeware - www.radio.cbc.ca/radio/tools/tools.html
Plays and records wide variety of sound files.

**Real Audio Player**: Freeware - www.realaudio.com
Streaming audio player for Internet-based files.

**Mac Audio Utilities**: Freeware/shareware - www.wimmera.net.au/wimhome/macsound.html
Interesting collection of Mac audio tools. Some are older but provide potentially useful features such as frequency meter, audio oscilloscope, and basic MPEG file player.
CHAPTER 20: MULTIMEDIA, MOVIES, AND SOUND

Movie/Video Hardware

As with audio on the Mac, video and movies can be inserted into multimedia productions fairly easily, but to edit motion files yourself, you'll need some additional hardware and software. We've titled this section movie/video hardware, but we're really talking about video here. You can digitize conventional motion-picture film by grabbing a projector output with a video camera. There are even professional film-chain-to-video devices used by television broadcast and cable companies, but this is really high-end hardware that we feel is beyond the scope of this book.

So let's talk about how to get video into your Mac. At that we'll only skim the top of the issue here because the digitized video market is a really broad—and hot—topic right now. New digital-camera technology is changing the way we handle video on the Mac almost daily. In this section we'll give you just the basics on how you transfer video to the computer. We'll leave up to you the rather more-lengthy project of finding out about all the options, formats, and other considerations.

Getting video information onto your Mac is a lot like getting audio information onto the computer. You need some kind of hardware interface that captures video information out of a camera or other source and stores it to disk. And you can use either analog or digital hardware to do this, depending on the source of your video material.

In practice the video output from your VCR or camera is fed directly into a port on a video Input/Output board inside your Mac. If you are using standard video sources, then the card in your Mac is an analog device. If you have one of the newer digital cameras that uses DV, D1, or other digital video formats, then you will need a digital card in your Mac to preserve the digital quality.

Among the more popular digital Input/Output connections today is the so-called FireWire or IEEE 1394 interface. It took awhile for hardware vendors to catch up with the video market on this one, but now you can find a variety of FireWire hardware to help you transfer video to your Mac.
FireWire is destined to make a difference in how we use our Macs. This is a fast, intelligent interface that serves well for full-frame, full-motion video, digital audio, disk-drive Input/Output, and potentially lots of other applications. Some industry experts predict that FireWire will begin to replace SCSI interfaces for inside and outside the-Mac devices. The IEEE 1394 standard currently supports up to 63 devices, for one thing. In addition, connections are simple (4- or 6-pin jacks), cross-platform hardware and software is hitting the market at the same time, and it is a hot-swap technology, which means you can attach and disconnect devices with the power on.

Connecting FireWire devices is relatively simple. You'll use a plug-in card (Apple has already promised to include FireWire interfaces on the motherboards of desktop and laptop computers beginning this year) for a high-speed bus. PCI cards, such as the Adaptec 8940 shown in Figure 20-1, are the most popular. Although these are dense cards, they are relatively small, considering their speed, up to 400 Mbps with current designs and plans in the works for 1 Gbps FireWire interfaces. That's fast! In addition, interface cables can be up to 4.5 meters long, which adds a good deal of flexibility to what you connect and how you connect it.

FireWire is exciting not only for what it can do for high-speed disk drive and video data transfer, but also for its potential as a crucial link in merging the desktop computer with consumer electronics of all types. Your Macintosh can become part of a video-editing solution when coupled with a FireWire-compatible digital camera or tape deck. For the technology-minded, Adaptec offers a FireWire O/S Developer's Kit (see Figure 20-2), which consists of an interface card, cables, and software.
Another digital transfer format you will encounter is SDI (serial digital interface). This is a common interface for professional digital video cameras and video decks. There are a number of SDI interface boards for the Mac.

**Movie/Video Software**

As with digital audio, digital video solutions require software as well as hardware. Not that long ago your options for video editing on the Mac were rather limited. Today the marketplace is so rich that all we can hope to do in this section is to introduce you to some of the most popular offerings.

Video editing on a computer, sometimes called nonlinear systems, can be extremely complex. Hardware and software prices have fallen in recent years, fostering the concept among many users that the process has gotten easier as well. In a way the process is easier, but successful video editing still requires a lot of experience and some innate skills. If you're working with fairly simple video for a corporate or personal multimedia presentation, then you can use readily available tools to help you do a nice job. If your goal is a professional-quality video for broadcast or general distribution, consider hiring a production company to do the work for you.

There are two basic types of video-editing software and untold support products for the Mac-based video editor. Full video-editing software requires that you digitize your video material. Once you have video playing on your Mac, you can cut and move scenes and generally organize your takes in any way you wish. Usually you digitize the tape in a low-quality, small-picture format to do your editing. Once the editing is finished you capture the scenes you will actually use in a higher-quality format.

Another type of computer-based editing package doesn't digitize any video. Rather it works with a hardware controller to let you identify scenes on tape that you want to use and organize these scenes in the proper order. Once the edit-decision list (EDL) has been built, the soft-
ware automatically shuttles the source video back and forth to the proper locations to copy the selected scenes to another tape.

Support software includes graphics and drawing, special effects, titling, and other utilities that help you produce a finished video. Video-editing products generally include video I/O hardware and editing software. Some of these systems are sold only as a package that includes a Macintosh computer or other extras.

Product Information for this chapter:

**AHA-8940**: Adaptec - [www.adaptec.com](http://www.adaptec.com)
IEEE 1394 FireWire, PCI-bus interface for digital data transfers.
Transfer speeds up to 200 Mbps.

**Avid Cinema**: Avid - [www.avidcinema.com](http://www.avidcinema.com)
Integrated hardware and software solution for video editing. Targeted at home, school, church, and other medium- to low-end applications. Avid also makes professional level video-editing platforms.

**Bravado 1000**: Truevision - [www.truevision.com](http://www.truevision.com)
Basic video I/O. Adequate for many if not most multimedia video I/O applications.

**Media 100**: Media 100 Inc. - [www.media100.com](http://www.media100.com)
Video I/O and editing software. Professional-quality system popular with many producers and production houses.

**Targa 2000 SDX**: TrueVision - [www.truevision.com](http://www.truevision.com)
SDI video I/O. Also supports optical and wired digital audio. Full-motion, full-screen video. Expensive!

**Video Director**: Pinnacle Systems Inc. - [www.videodirector.com](http://www.videodirector.com)
Controller and software that lets you create an edit-decision list (EDL). No downloading or digitizing of video. Parallel port hardware interface. Once EDL is created, software controls video sources to produce final edit. Includes software for titles, video editing, and audio editing.

**Video Vision Studio**: Radius - [www.radius.com](http://www.radius.com)
Analog I/O Card with standard and optional video-editing software. Wide range of hardware and software options.
YOU ALREADY KNOW YOUR MAC IS A GREAT MACHINE. YOU KNOW it owes a large part of its success to graphics and desktop publishing, which put it on the map. What you probably don’t know is that a piece of the most important and serious business software today is responsible for the very existence of Apple Computer. Yes, without the lowly spreadsheet, there may have been no Apple to create the Macintosh. Read on.

After word processing the two most popular applications among desktop computer users are spreadsheets and database management systems. These two have vied for second place for years. We suspect one reason for the variation is who conducts the survey and when. Besides, computing, like any other aspect of our society, is prone to changes with the winds of trend and fad.

In this chapter we’ll introduce number crunching with spreadsheet programs and managing every other kind of data with database management systems. We’ll show you how these applications are designed, how you can use them to solve real-world problems, and provide some real-world examples of application software you can use.
Spreadsheets

There's a lot of history in number-crunching programs such as Microsoft Excel or ClarisWorks. Those of us who remember the earliest desktop computers, including the early Apple offerings, remember when the hardware was all but useless. To do anything useful with an early desktop computer users had to program their own applications in BASIC (Beginner's All-Purpose Symbolic Instruction Code). There were other programming languages, but BASIC was by far the most common and most available.

This process wasn't particularly easy and it made using a computer a very different experience from what it is today. In those days programming the machine was a major part of the whole experience. Doing useful work was only part of it.

Into this relatively exclusive, often cumbersome and frustrating computing environment stepped a history-making product called Visicalc. Written for the Apple II by Dan Bricklin, Dan Fylstra, and Bob Frankston in about 1978, Visicalc was the first spreadsheet product. And in the opinion of many industry experts, Visicalc was largely responsible for the success of Apple Computer.

Why? Again, think about a computing environment where there are no finished applications, where to make anything happen on this new, exciting hardware you first have to write the program. That's like having your spouse say, "Honey, it is time we moved into a larger house," and you saying, "Right. Give me some time to make a hammer, a saw, and a wheelbarrow, and I'll get started on a new one."

There were computer programs available in those days, but they were highly specific and forced the user to conduct operations and interact with the program in a proscribed way. Visicalc was the first program that let the user do useful work and change the way the program functioned without requiring the user to be a programmer. Since the Apple II at the time was the only computer with a user-configurable pro-
gram, the Apple II platform became extremely popular.

The Macintosh is a very different computer from the 20-year-old Apple II, and today’s number-crunching software does things none of us would have even imagined back in the Visicalc days. In this section we’ll look at some of the new and interesting things you can do with the combination of a Macintosh and a modern spreadsheet or spreadsheet-like program.

**Spreadsheet Defined**

Spreadsheets are about numbers. The earliest spreadsheets, such as Visicalc, would do little more than manage numbers and that not very creatively. Figure 21-1 shows an early spreadsheet from Visicalc, courtesy of Apple Computer. Today’s software handles charts, text, and graphics; they can even include sound, animation, and motion video. But number management is still a spreadsheet’s strength.

![Figure 21-1: Visicalc Spreadsheet](image)

Electronic spreadsheet software is basically a computer-based version of the familiar gridline ledger paper you’ve probably used for basic accounting or other numerical management tasks. Consider the simple paper ledger shown in Table 21-1, simple but typical of a tool you might use to track income and payments at home or work.
CHAPTER 21: CRUNCHING NUMBER AND MOVING DATA

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
<th>Ck/Xactn</th>
<th>Account</th>
<th>Income</th>
<th>Expense</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/1/99</td>
<td>Beginning Bal.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1000.00</td>
</tr>
<tr>
<td>8/11/99</td>
<td>Invoice 2345</td>
<td>512</td>
<td>3001</td>
<td>-</td>
<td>233.13</td>
<td>$766.87</td>
</tr>
<tr>
<td>8/15/99</td>
<td>Rent</td>
<td>1024</td>
<td>4010</td>
<td>725</td>
<td>-</td>
<td>$1,491.87</td>
</tr>
<tr>
<td>8/15/99</td>
<td>Miscellaneous</td>
<td>2048</td>
<td>6025</td>
<td>-</td>
<td>396.14</td>
<td>$1,095.73</td>
</tr>
</tbody>
</table>

Table 21-1: Sample Paper Ledger

Work this simple can be maintained easily with a conventional paper ledger, but if you discover you have made a mistake or if the task gets much more complex, then you have to erase and correct or make correcting entries. Moreover, you have to use a calculator or compute the figures manually to determine the values in the last column.

The difference with an electronic ledger is that behind that electronic grid is a whole collection of built-in formulas and functions that you can use to calculate automatically the relationships among the values in your ledger. The early spreadsheets let you do simple tasks such as add a column of numbers or multiply the value in one location by the value in another position. Fairly quickly more sophisticated functions were added, such as loan calculation and amortization, trigonometric functions, and more.

Today's spreadsheet software does all of these things, plus some additional useful tasks that you may need only if you work in a specialty industry. And, of course, the electronic nature of the data management means you can conduct what if calculations, a concept made easy-and made famous-by spreadsheet software.

Suppose you design a business plan that makes certain predictions about income and expenses. Then you want to see the effect of a 10 percent increase in expenses or a 2 percent rise in income. You can change a few numbers and watch the whole model update automatically if you have entered the formulas to link the relevant cells. A spread-
sheet program also can duplicate federal tax tables and automatically calculate payroll deductions for a small business; and it can use raw numerical data as the input for a pie chart or bar graph for a different view of your numbers.

Like the early Visicalc, today's spreadsheets let you create custom formulas using built-in math functions, but the spreadsheets you use on your Mac also include intrinsic, complex formulas to calculate loan payments, interest, future value, trigonometric functions, and more. Many also include software tools that help you conduct data analysis and organize data into reports for printing.

Spreadsheet Components

Before we discuss some of the specific features of real-life spreadsheet products for the Mac, let's look at the major features and components of a spreadsheet program. Consider the screen in Figure 21-2. This portion of a simple spreadsheet screen shows you the basic components of a spreadsheet without the menus and other control features that vary from product to product.
Notice in this example how a spreadsheet is, indeed, like a conventional ledger sheet. Horizontal and vertical grid lines intersect to define cells to hold spreadsheet data. A pair of horizontal grid lines defines a spreadsheet row and a pair of vertical grid lines defines a spreadsheet column. Alphabetic letters identify spreadsheet columns; numbers identify spreadsheet rows. To uniquely identify an individual cell, use the column letter and the row number. Different spreadsheet products use different conventions to do this, but one popular syntax is to separate the column and row information with a colon. So to specify the cell that is located on the 10th row in column C you would say C:10. Notice that the first row is number 1 and the first column is A, so the first cell on any sheet is A:1. How many columns and rows are contained in each sheet depends on the product, but most modern spreadsheets support at least 256 columns and 8,000 or more rows. Microsoft’s Excel spreadsheet, part of the Office suite and a popular Macintosh spreadsheet software package, supports up to 256 columns and up to 65,536 rows.

So how do you count up to 256 when all you have are the letters of the alphabet? Easy. The first 26 columns are labeled A through Z, as you would expect. Column 27 is labeled AA, column 28 is AB. When you run out of alphabetic identifiers with this scheme (column AZ), the next column is BA, the next one BB, and so on. Of course following that is the CA, CB, CC... sequence. Figure 21-3 shows a sequence of cells at the end of an Excel spreadsheet, with cell IV:65536 labeled. Now use some of your grade-school math to figure out how many individual cells are contained in a spreadsheet with 256 columns and 65,536 rows. Let’s see, that’s 256 stacks and each stack holds 65,536 things. So 256 X 65,536 = 16,777,217.

Hmmm. There are a couple of familiar numbers there. Did you read the discussion on color depth in the chapter on graphics? The number of rows supported by Microsoft Excel is, of course, 2 to the 16th power ($2^{16}$), and the total number of individual cells is the same as the number of available colors in a 24-bit color system ($2^{24}$). These are sort of magic numbers in a 32-bit computing environment, aren’t they?
One more interesting fact about Excel. You can enter up to 32,000 characters in any single cell. Not that you’d actually want to, since the result would be unmanageable, but you could. Now if you entered 32,000 characters in all of the 16,777,216 cells on a full spreadsheet you’d have how many characters?

Just kidding, but we use this example to lead into another important consideration. If you were to fill up every cell in this way you’d probably run out of RAM and perhaps even hard disk space to store the resulting gargantuan file. If you enter information in only a few cells of a spreadsheet, however, the program is smart enough to know you aren’t using all 16 million cells, so it provides storage only for the cells you actually use. This makes spreadsheet file storage relatively efficient, as data management programs go.

Some spreadsheet programs also can support multiple sheets within a single file. Excel calls the collection of multiple spreadsheets within a
CHAPTER 21: CRUNCHING NUMBER AND MOVING DATA

single file a workbook. The advantage to this approach is that you keep together related figures about a single project, company, or account. These multisheet products may support 16 or more individual sheets and you can tie these sheets together with cross-sheet formulas. So, for example, you could place monthly sales figures on individual sheets that provide details by product and date, then you could construct a master sheet that summarizes the data by month for the year. The monthly summary data comes from the individual monthly sheets that are part of the workbook. That concept is demonstrated in Figure 21-4. The information is bogus, but you can see the concept from this illustration.

![Figure 21-4: Monthly Summary](image)

**Entering Spreadsheet Data**

If you haven't used a spreadsheet program before you will quickly see why this application became so popular over such a short period of time and why it still ranks very high in user appreciation. The real power of any spreadsheet program is the layered nature of its design. You can use the program to do little more than a paper ledger, as a storage place for text and numbers that print nicely and are easily changed. Or, you can use the spreadsheet as the foundation of a complex application with such custom features as a unique user interface, your own formulas and functions, and custom operation.
And the really good news is that learning to use nearly any spreadsheet program at this lower level of functionality is virtually painless. The printed ledger design makes an open spreadsheet on your Mac desktop seem quite familiar and its operation intuitive. However, there are a few little quirks in the way a spreadsheet accepts and manages data that can drive you crazy if you are accustomed to a word processor or something else a little more traditional. We'll show you in this section basic spreadsheet data entry and editing techniques.

Microsoft Excel was one of the first killer applications for the Mac. At a time when PC-compatible users were operating in a text-only world, Mac users had a graphic user interface (GUI), and Excel—a program written by a DOS-oriented company—adhered very closely to that GUI standard. Then as PC users adopted the Windows GUI environment, Microsoft produced a version of Excel for Windows, a version with a distinctively different look and feel from their other business product offerings such as Word. With the latest releases of the Office suite for Mac and PC, all programs are moving closer into their respective realms, but for a long time the Mac heritage of Excel was quite noticeable in the PC world.

In the early Mac days, Microsoft was the largest Macintosh developer after Apple itself. Bill Gates paid a great deal of attention to the new computer and looked for signs as to the next OS on the PC platform. To a large extent Excel proved that there was a useful task for the GUI in the business world and went a long way toward defining the computing environment Bill Gates wanted, and is

Typing the Data

When you launch a spreadsheet program such as Microsoft Excel you are presented with a blank electronic ledger, much like opening a new paper ledger for the first time. You can use the mouse to choose a cell anywhere on the extensive grid and simply type anything you want. You can enter at least four types of data into a spreadsheet grid:
CHAPTER 21: CRUNCHING NUMBER AND MOVING DATA

1) Text
2) Numbers
3) Formulas or functions
4) Graphics

When you select a cell with the mouse and type text, as you would for a title or column heading, text appears in two places as you type. You'll see your typed information within the selected cell, and you'll see the same text mirrored in the formula bar just above the column labels.

As we have said Excel is a popular Mac application and, because it set the stage for spreadsheet operation early on for the Macintosh, many other products operate in a similar way. If you are just getting started with spreadsheets, use our descriptions as a general guideline that you can adapt readily to the precise product you are using.

A spreadsheet cell is formatted by default to hold up to nine characters, but as you enter information the data will spill over into adjacent cells. Suppose you open Excel or another spreadsheet program and click in cell B:5 to enter the first text. After you have typed nine characters you will see information spilling over into cell C:5, to the right of the starting cell. Type more text and it will appear in cell D:5, and so on. When you have entered the text or numbers you want in the current cell, press Enter to move to the next cell in the column (below the current cell) or press Tab to move to the next cell in the row (to the right of the current cell). You can also use the cursor keys on your keyboard to move to the next cell for data entry. Up, Down, Left, and Right keys set the information you have typed in the current cell and move to one of the adjacent cells.

As you move out of the current cell, one of two things happens. If the cells to the right of the cell where you entered the last information are vacant, then any text longer than nine characters spills over into adjacent cells. If the cells beside the cell where you entered the last data have something in them, however, the new information will be truncated after nine characters.
Most spreadsheets handle numerical data a little differently. If you type a number longer than nine digits the cell holding the long number may show a string of pound signs (#) when you move out of the current cell. This indicates the value entered is too large to display properly in a nine-digit cell. Any calculations you conduct using this too-long number will be correct since the number is actually stored correctly in the cell. The spreadsheet just can't display it properly if the number is too wide to fit within the current cell width. If you enter a very large number that won't fit the current cell width the spreadsheet may convert it to scientific notation. In this format a large number consists of one number followed by a decimal point, and the rest of the number followed by a caret (^) and a final number indicating how many places to move the decimal to derive the real number.

Some spreadsheets, on the other hand, try to anticipate your needs and may simply expand the width of the column that contains the cell with the large number. This can be useful, or it can be annoying, depending on how you have formatted the other areas of the spreadsheet.

Another interesting feature of spreadsheet software such as Excel is the way the software tries to anticipate what you want to do next by studying what you have already done. For example, when you click in a specific cell and type a number, Excel assumes this is the first cell in the first column or a range of cells you will use for numerical data. Now if you enter several numbers in adjacent cells in the same row, creating a horizontal series by pressing Tab after each number is entered, you can press Enter when you have the last number in the series entered and Excel makes an intelligent assumption. Rather than moving down one cell to the cell immediately under the last one in your row of numbers, as you might expect, Excel moves the insertion point back to the beginning column, one row down, so you can begin entering data for the second row. Excel even remembers the starting column if you leave some cells in a row blank. Consider the spreadsheet fragment shown in Figure 21-5. You can see that we have designed an eight-column range or grid of cells, but some of the cells are blank.
CHAPTER 21: CRUNCHING NUMBER AND MOVING DATA

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Column 1</td>
<td>Column 2</td>
<td>Column 3</td>
<td>Column 4</td>
<td>Column 5</td>
<td>Column 6</td>
<td>Column 7</td>
<td>Column 8</td>
</tr>
<tr>
<td>2</td>
<td>123</td>
<td>456</td>
<td>789</td>
<td>876</td>
<td>543</td>
<td>210</td>
<td>123</td>
<td>456</td>
</tr>
<tr>
<td>3</td>
<td>555</td>
<td>1212</td>
<td>444</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>333</td>
<td>777</td>
<td>897</td>
<td>321</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>321</td>
<td>567</td>
<td></td>
<td>123</td>
<td>909</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>997</td>
<td>456</td>
<td>123</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 21-5: Eight Column Spreadsheet

However, as you enter numbers in a spreadsheet range such as this one, Excel remembers the first column and will always return to it when you press Enter, regardless of which column the insertion point is in. Notice that this is true even if you press Tab one or more times to leave cells in some columns blank. Of course you can always use the mouse to select the cell you want to hold new data, but if you experiment with the way Excel and other spreadsheets behave during data entry, you can save some time and keystrokes.

Editing Cell Information

To edit the data in the current cell before you have exited the cell, simply use the cursor navigation keys and backspace or delete to make changes as you would in a word processor or other text program. However, once you have exited the cell you can’t just use the editing techniques you are accustomed to.

After you press Enter or Tab to exit a cell during data entry, the cell information is fixed. If you click within this cell again to select it, anything you type will replace everything already there. If you have 20 characters already entered in a cell, for example, and you select it and type even one character, all 20 characters go away, replaced by the single character you just typed.

Editing information in a cell once you have left it takes an extra step. First click the cell to select it (or use the cursor-movement keys to move the insertion point into the cell). Then click in the formula bar at
the top of the screen where the current cell data is mirrored. You can edit cell data here using the cursor keys, backspace, and delete in the normal way. When you are finished with the edit, press Enter and the new information is fixed in the cell and the insertion point is moved to the next cell in the column. You can press Tab to finish the edit and move the insertion point to the next cell in the row. However, you can use the cursor-movement keys to quit the edit since the spreadsheet assumes you want to move back and forth within the current information to change it, not exit the cell.

Most spreadsheet software is smart enough to know the difference between a number and text. When we first started using spreadsheets we had to tell the program when we entered text by preceding the text entry with an apostrophe. Now the programs are pretty smart. If you enter 1234 and press Enter or Tab the information is accepted as a number and positioned to the right side of the cell. This automatic right justification for numbers is so their decimal places, if any, will line up and everything will look nicely formatted. If you enter text, on the other hand, the information is left justified when you exit the cell. And, you can even enter combinations of data, such as 1234 New Street, and the program knows whether to format it as text or numbers.

**Using Formulas**

Remember we said earlier that one of the data types you can enter into a spreadsheet cell is a formula or function. A formula—remember your high-school algebra classes?—is a shorthand statement of the relationship among the numbers in a cell or among the values entered in different cells. A function is a programming term. It can be just a formula (usually a complex one) or a series of program statements that cause some action or result. Spreadsheets include built-in functions and formulas. We’ll show you some of those a little later.

Let's talk about formulas. Suppose you are creating a spreadsheet to replace the paper ledger shown in Table 21-1. For the most part you will create this ledger in a spreadsheet such as Excel by opening a new
spreadsheet file and typing in the information shown in the table. That's true for everything but the last column in the spreadsheet. Look at Figure 21-6. This is a new spreadsheet file with the information except the last column from Table 21-1. The information in this figure is shown just the way Excel formatted it. This shows how information that is too long to fit into its cell of origin—the cell where the data starts—gets truncated when the cell next to it is not empty. We know, the formatting in this figure isn't too pretty, but stay with us. We'll talk about how you can format this information in the next section.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spreadsheet from Table 25-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Date</td>
<td>Description/Ch/Xactn</td>
<td>Account</td>
<td>Income</td>
<td>Expense</td>
<td>Total</td>
</tr>
<tr>
<td>3</td>
<td>8/1/99</td>
<td>Beginning Bal.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>8/1/99</td>
<td>Invoice 23</td>
<td>512</td>
<td>3001</td>
<td>233.13</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>8/15/99</td>
<td>Rent</td>
<td>1024</td>
<td>4010</td>
<td>725</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>8/15/99</td>
<td>Supplies</td>
<td>2048</td>
<td>6025</td>
<td></td>
<td>396.14</td>
</tr>
</tbody>
</table>

*Figure 21-6: New Spreadsheet File*

The point is, to reproduce this much of the paper ledger shown in Table 21-1 all we had to do was click in a vacant spreadsheet cell and start typing. This includes even entering dates. The spreadsheet is smart enough to know that 8/15/99 is a date and automatically formats it as such. The text and other numbers in this figure also are interpreted correctly and receive basic formatting automatically.

Now what about the final column? We could just type in the information like we did for the other data, but then we wouldn't be taking advantage of the power of the spreadsheet software. Instead we'll enter a formula in the second cell of the final column and then copy that formula down the column into the other cells. This little exercise will show you some important, basic information about the way spreadsheet software works.
First we'll enter a plain number for the beginning balance in cell G4. This is a fixed number that won't change, so we can just type it in like we did everything else.

Now, what about the value in cell G5? If you look back at Table 21-1 you see that the number in that position is $766.87, which is the difference between the beginning balance of $1,000 and the first expense of $233.13. However, think about what we are really saying on this row. If you were to interpret that row yourself, wouldn't the logic go something like, "We start with one thousand dollars. Did we receive any money? No, so we still have just a thousand dollars. Now, let's see, did we have any expenses for that line? We did, $233.13. So what we have left is the original $1,000 minus the expense."

Notice that there are really two calculations in our sample logic. First we add any payments to the original amount, then we take away any expenses. The result is the running total that belongs in cell G5. Since the income, if any, for row five would be placed in cell E5, and the expenses for row five are placed in cell F5, we can express this human logic in spreadsheet logic this way:

\[ +G4 +E5 -F5 \]

This is simple math. Remember that the spreadsheet software tries to interpret the data you type as numbers or text. If we were to type just \( G4 + E5 - F5 \), that's what you'd see in cell G5. By placing the plus sign at the beginning of the line we tell the spreadsheet that this is a formula that says:

1) start with the value in cell G4
2) Add to that value the amount in cell E5
3) Subtract from that total the value in cell F5
4) Place the result in the current cell (G5 in this example)

The results of the formula are displayed in the cell that holds the formula. Notice how the spreadsheet maintains two levels of information.
tion: the formula level and the value level. What you see in the cell that contains a formula is the results of the calculation.

See how simple it is to construct your own formulas in a spreadsheet? A little like those written problem calculations from sixth grade, right? Wish you'd been more attentive?

You can see from this example that adding and subtracting values in a spreadsheet is a lot like you'd do it by hand. You use the plus sign (+) for addition and the minus sign (-) for subtraction. How do you divide? Use the forward slash (/) to separate the dividend from the divisor. The symbol for multiplication is the asterisk (*) and you can raise a number to a power with the caret (^).

Now, one more interesting spreadsheet characteristic that is really important, the way formulas are copied to different cells. We'll copy the formula in cell G5 into cells G6 and G7. You can do this about like you'd copy text in a word processor:
1) Click in cell G5 to select it.
2) Use the Edit Copy menu sequence to copy the formula. Notice that this action copies the formula, not the value displayed in the cell.
3) Use the mouse to select cells G6 and G7.
4) Use Edit Paste to copy the formula to the selected cells.

"So," you say. "That's not news. I know how to copy stuff." OK, but let's click in cell G7 to select it and to produce the display shown in Figure 21-7. We've included more of the display than with other figures so you can see the formula bar just above the column labels. Look closely at the formula displayed there. It says:

\[=+G6+E7-F7\]

Excel adds an equal sign to formulas and notice the cell values. We copied a formula that said +G4+E5-F5 and we got one that uses G6, E7 and F7. That's Excel's relative copying. When you enter a formula into a
cell the underlying software doesn't really refer to the cells in the formula by an absolute address. It uses relative addressing. So when we enter in cell G5 a reference to G4, the software says to itself, "the cell one row above this one." A reference to cell E5 tells the spreadsheet to reference a cell two columns to the left, and so on. Therefore, when you copy a formula into a new cell, the relative locations of the cells the formula references change as well.

You can turn off relative addressing by the way you specify a cell within a formula. Simply precede any part of the cell reference with a dollar sign ($) to force the spreadsheet to retain the original cell address. For example, if we entered in cell G5, this formula:

\[ +$G$4+$E$5-$F$5 \]

Then we would see the same value appear in cells G5, G6, and G7 because the formula we copied would be the same in all cells. It should be obvious that this discussion of formulas only begins to scratch the surface. We'll leave you on your own to discover the depth of formula and function support in your own spreadsheet package. This section was intended to help you understand the basic process so you will have an easier time learning what you need to know about your particular software.

**Formatting Numbers**

Look again at Figure 21-7. Pretty ugly, yes? That's because we have entered all the information into this spreadsheet with default column widths of 9 characters, and we haven't applied any special character attributes. We'll show you the basics of this process in this section.

The easiest way to increase the width of a column is to grab the grid line at the top of the column and drag it to the width you want. This works for most spreadsheet products with which we are familiar. In Excel you can also move the mouse cursor over the top, vertical grid line of the column you want to adjust and double click it. Excel auto-
matically adjusts the column width - wider or narrower - to accommodate the widest data in the column.

Then you can improve the appearance of the spreadsheet by adding character attributes to individual cells. Click a cell and choose bold face from the tool bar in Excel for example, or turn on italics for emphasis. You can also set the size of the font in individual cells or the whole spreadsheet in much the same way as you would in a word processor.

Then you might want to format the numbers within individual cells. You can see from the previous screens in this chapter that the numbers in our sample spreadsheet are displayed without any special formatting. However, the information we are displaying in this sample spreadsheet is mostly dollars, so why not tell the spreadsheet to display the numbers automatically in the form you want? In Excel and many other spreadsheet programs you use the cell format feature to do this. You also can set other number attributes, including the number of decimal places, how to display negative numbers, and how to display numbers larger than 999 (commas to set off thousands, periods, etc.).

Of course you have control over the normal text attributes you would expect in a modern program. You can set the text or numbers within a cell to italics, for example, choose a bold type face, underline the information, and so on. You have control over where text and numbers appear within a cell as well. Use the left-, center-, and right-justify menu choices or tool bar icons to place the information where you want it.
Spreadsheet Database Management

Many spreadsheet programs include some form of database support. You can enter information under named columns, then retrieve it much like you can with a true database program (See the next section for more details on database management software). If your data management needs are small and you don't mind dealing with a less-than-ideal user interface, this might be the way to go. However, in our opinion, using a spreadsheet for database management is a little like driving a nail with a screwdriver. You can probably do it, but if you had a hammer available you wouldn't. If you have a database management program available, don't use your spreadsheet for database duties.

Mac Spreadsheet Programs

You'll have to do your own due diligence to find a spreadsheet program that works for you. Here's a brief list of popular products for the Mac to get you started.

**Excel**: Microsoft - [www.microsoft.com/excel](http://www.microsoft.com/excel)  
Premier Mac spreadsheet. Full featured. Links well with other members of Office software suite. Cross-platform design enhances use in multi-computer environments.

**ClarisWorks Office**: Claris - [www.claris.com](http://www.claris.com)  
Integrated office suite that includes data management, word processing, and spreadsheet functionality.

**Works**: Microsoft - [www.microsoft.com/works](http://www.microsoft.com/works)  
Integrate spreadsheet, word processing, database, communications and other tools. Cross-platform design.

**4D Calc**: ACI US Inc. - [www.acius.com/home.html](http://www.acius.com/home.html)
BiPlane Deluxe - Night Diamonds Software (Shareware)
www.shareware.com - 714-842-2492
Compatible with Microsoft Excel. Supports 512 columns and 16,384 rows. No documentation with download package, but with registration user gets 200 page manual. Open four spreadsheets at once.

Spreadsheet 2000: Casady & Greene - www.casadyg.com
408-484-9228

Wingz Investment Intelligence: www.wingz.com - Cross-Platform.
Spreadsheet with hyperlink and SQL support. Mac graphical interface.

Adrenaline Numbers & Charts: Adrenaline Software
Graphics-oriented spreadsheet. Includes QuickDraw 3D to provide highly-Mac-Compatible user interface. Very strong charts and graphs as well as graphical spreadsheets. Supports drag-and-drop number entry from within the Numbers spreadsheet or from other Mac applications.

Databases

Everything we do with our Macs involves data management. If you’re mostly doing word processing, you’re managing text data that includes formatting. Graphics? You’re creating image files of a particular type and style that you use as screen art, magazine illustrations, or whatever, but you have to store that data, remember where it is, and retrieve it for use. Presentations, spreadsheets, accounting information, or charts and graphs – all deal with different types of information that you manage using the computer.

However, there is a particular type of data management that we call database management. Database management involves entering, storing,
tracking, organizing, and reporting on a broad range of data types using database management software. Information stored using one of these programs is called a database.

**A Database Definition**

Traditionally a database is information about closely related items stored so that it can be accessed in a variety of ways. For example, all of the cookbooks in your kitchen form a database about cooking and recipes. No single book has all of the data you may want to access and, in fact, the same information can be retrieved in different formats depending on which cookbook you consult.

You could look at database storage another way. All of the books in your personal library certainly form a database about a very broad range of topics. However, we normally don't collect such a variety of disparate data within the same computer database. Instead, we break up this broad collection into separate, more focused, databases. One database might store cooking-related data, as we mentioned, then you would have a database for electronic parts, another for names and addresses of business contacts, and so on. Although you can physically design a computer database to store and track a collection of data of any type, and you can put everything into a single file or database, it is not a particularly efficient thing to do.

On the other hand, if you were running a food-related business, say, it might make sense to store recipes and the inventory of raw materials required to prepare these recipes in the same database. Likewise, you might track an inventory of electronic parts along with the names and addresses of your customers and their needs.

**Database Components**

The advent of low-cost and powerful desktop computer platforms such as the Mac have change some of the long-standing database tradition
that set the stage for computer-based data management. The term
*database* means something very specific to traditional computer types
and also to the designers of business-oriented, relatively high-end soft-
ware that does database management. In today’s Mac market you will
see the term used differently from what we describe here, and that’s
OK. But for our purposes we will stick to a fairly traditional database
definition.

First let’s talk about the individual components that make up a tra­
ditional database. We’ve listed those in Table 21-2. Notice that there are
two broad types of database information: data definition or description
and the data or information itself.

### Database Element Description

<table>
<thead>
<tr>
<th>Database Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table</td>
<td>A well-defined storage location for closely related information. A table can be a separate file or a location within a file. A table contains the other data elements listed here.</td>
</tr>
<tr>
<td>Record</td>
<td>Individual data elements that describe a single table entry. A record is a logical entity that describes the information stored in a table. A name-and-address table, for example, would contain multiple records, each of which stores a single name and address.</td>
</tr>
<tr>
<td>Field</td>
<td>The smallest element of a record; the individual components of a record. In a name-and-address table, for example, there might be one field for first name, another for last name, still another field would store the street address, and so on.</td>
</tr>
<tr>
<td>Data</td>
<td>Information stored in the other table components. Whereas the other table components describe information stored in a table, the data is the information itself.</td>
</tr>
<tr>
<td>Attribute</td>
<td>A description of how the information in a field or record is stored. A field with a numerical attribute would be used to store accounting data or inventory amount. A field with a text attribute would store a name, and so on.</td>
</tr>
</tbody>
</table>

*Table 21-2: Database Elements*

In addition to these general database elements, every component is
named. So, for example, a database that stores basic contact or name-
and-address information could be designed with two tables, one that holds information about the companies you are tracking and one that holds information about the people who work for those companies. Think about a printed telephone directory that is arranged by company. You would look up the ABC Corporation, which would have a main entry that included the street address and main switchboard number for the company, then beneath this main entry would be 100 entries, arranged alphabetically, for the employees. Beside each employee entry would be a direct telephone number or extension and maybe information about that employee's physical job location. Then you turn the page to BCD Corporation and you see the same information for this company.

In the Mac database world these two types of information—company and employee data—would be stored in two separate tables. You could still print a comprehensive telephone directory like the one we just described because the data in these two tables is related, or linked, through a common piece of information. This relation could be the company name, for example, or a shorter (and easier to manage) company ID. The company ID could be a sequential number, which is very precise, or a shortened version of the company name, such as ABCCO, which may be less precise but is easy to remember. This relational or link data appears in both tables beside the appropriate record entries. The Company table has one record for each company. The Contacts table, on the other hand, has one record for each employee, so there is an unknown number of Contacts records. Each employee record also includes this company ID information. This concept is illustrated in Figure 21-8,
which shows a Company and a Contacts (people) table inside a database program. The relationship between these two tables is frequently called a one-to-many relationship, which refers to the fact that one record in the Company table can relate to or link to many records in the Contacts table.

This relational design isn't limited to only two tables. Suppose the contacts database example also included an element to track individual purchase transactions for each company. We could create a third table to hold these transactions and link them to the company with the company ID code. Or, we could create a unique contacts code for each record in the Contacts table and link transactions to individuals, depending on what type of relationship makes the most sense for your application. Can you see that even if you link the transaction table to individual employees you could still produce a list of all transactions for a particular company? This works by linking first to the Contacts table, locating all the transactions for a particular employee, finding the company that person works for using the company ID code, then going to the next transaction.

Now imagine a fourth table that tracks every telephone call or other contact you have with the people in your contacts database. That would produce four tables in the database with three of them - contacts, transactions, and telephone calls - related and one of those three - the contacts table - related back to the company table.

It should be fairly obvious how this arrangement reduces data storage requirements and eliminates most redundant data entry. Without this two-table relational design, you would have to type the company name and address information each time you entered the information for a new employee. That's not much of a problem if you're dealing with a company that has one or two employees. If each company has 100 employees, you've wasted a lot of someone's time typing unnecessary information and you're using a lot more disk storage space than you ought.
**Program Tools**

In most database programs you would determine yourself what information you need to track, design a data structure that includes the tables and relationships you should use, then build the structure. Different software has different levels of user support, however, and some programs help make the job of database design quite easy. These helpful programs are supplied with templates for certain types of data management, such as inventory, professional time management, employee records, sales tracking, and more. Software that includes such templates help you create professional and functional database designs almost automatically.

**Database Views**

Once you have determined the best data structure and you have created the tables to hold it, you are ready to enter information. In most programs there are at least two ways to view and edit data. You can use a single table display that resembles a spreadsheet, like the screen in Figure 21-9, or you can use a form that organizes the information into a format that is easier to use, in most cases, than the spreadsheet display. These formatted views usually are called forms and they are capable of displaying and accepting information from more than one table at a time. The screen in Figure 21-10 shows how a form that permits editing of information from two tables might be constructed. Although today's user-friendly database software mostly makes creating these forms a

---

### Figure 21-9: Single Table Display

<table>
<thead>
<tr>
<th>Project ID</th>
<th>Project Name</th>
<th>Project Description</th>
<th>Client ID</th>
<th>PO Number</th>
<th>Proje</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Georgetown University</td>
<td>Review and edit University RFP and contract amendment letter</td>
<td>3</td>
<td>Verbal</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Sales Team Documentation</td>
<td>Write sales team project book and other documentation</td>
<td>3</td>
<td>Verbal</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>PPM Documentation</td>
<td>Produce PowerPoint, HTML, and printed documentation to accompany current PPM</td>
<td>3</td>
<td>Verbal</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Presentations and PR</td>
<td>Conference, clincal &amp; other PR activities</td>
<td>3</td>
<td>Verbal</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Administration</td>
<td>General corporate</td>
<td>3</td>
<td>Verbal</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Board of Directors</td>
<td>Duties of the Secretary of Board of Directors</td>
<td>3</td>
<td>Verbal</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Newsletter</td>
<td>Design and write newsletter on Chiropractic Services</td>
<td>6</td>
<td>Verbal</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Telemarketing</td>
<td>General advertising and marketing. Chiropractic Services</td>
<td>6</td>
<td>Verbal</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Marketing</td>
<td>Investigate Products and Services. Work to integrate CommunityNet into USIF family</td>
<td>3</td>
<td>Verbal</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>CommunityNet</td>
<td>Investigate Products and Services. Work to integrate CommunityNet into USIF family</td>
<td>3</td>
<td>Verbal</td>
<td></td>
</tr>
</tbody>
</table>

(*AutoNumber*)
fairly easy task, creating and editing records in multiple tables simultaneously actually is a very complex. Luckily, as a user, this level of database operation is not something you need to worry about.

![Figure 21-10: Two Table Edit](image)

You do need to worry about how you are going to retrieve the data you have entered into a database in a form that is useful to you. Again, intrinsic tools available with most database programs makes this process a whole lot easier than it was just a few years ago. Database management software usually includes two types of generic tools to help: queries and reports. They may have slightly different names in different programs, but their functions are basically the same from program to program.

### Database Queries

A database query is simply a way of retrieving specific information from a specific database. Professional programmers write queries in a query language, such as SQL (structured query language). End user database products may ultimately use SQL to retrieve the data, but as a user you don't have to write SQL instructions unless you want to.
Most database programs include query tools that help you find the information you want by simply filling in the blanks of a form or table data display. Consider the display in Figure 21-11. This is a typical data retrieval form that is linked to the Company table of a sales lead database. Notice that the form includes fields for common information you might want to track about a company. To locate a specific company or a list of companies from the database, all you need to do is fill in the blanks or perhaps add simple data limiting commands in one or more fields. As you can see from the illustration we are looking for any company from the state of Tennessee that has purchased more than $5,000 in products but who hasn’t purchased anything since 1/15/99. We have specified these query criteria by typing TN in the state field of the data retrieval form, by entering >5000 in the Total Purchases field, and by specifying <=1/15/99 in the Date of Last Purchase field.

When you start the search after giving the program these data retrieval criteria, the specified table - Company in this case - is opened and the search for records that contain matching is started. If you could look behind the search form you would probably find a query command, perhaps written in SQL, that drives the search. An equivalent SQL query for this sample search is:

SQL is just one possible query language, but it is by far the most popular one. If you are interested in programming at this level, many user-friendly programs will let you. They are generating these queries to submit to the database program anyway. You can probably bypass the user-friendly form and do it yourself.

After the query has run, you probably will see the found records displayed in a table or spreadsheet format. You can scroll up and down this list to view the information, you can print this list in the spreadsheet format, and with most programs you also can type new information or change data right from the query or found records display.

The previous example showed a simple query that retrieved data from a single table. A more useful query is one that retrieves information from multiple tables. Some programs can do this with special forms that help you construct the query. Other database products can only retrieve information from multiple tables simultaneously when you use a report writer.

**Database Reports**

For many data retrieval operations just seeing the information in a spreadsheet form or printing this form on a printer is enough. For different applications, however, you may need to present specific records, such as those found in a query as we described in the previous section, in a more formal or flexible way. That's the job of a database report writer.
Database reporting software may use the data retrieved from a separate query or a query utility may be built into the report writer itself. Either way you use the report writer to print or display specific database information in a controlled way. You might use a report to print mailing labels or envelopes for all of your customers or for only those customers who haven’t purchased anything in the past three months. You might want to do this as part of a sales campaign targeted at reviving older sales leads or customers.

There are two basic steps to designing a database report: 1) specify which records you want to include in the report, 2) tell the report writer where on the page to print specific information from the found records. As we said, you may specify which records to include in a new report by using the separate query utility then telling the report writer to use only the records contained in this query in the report. Or, the report writer of your database software may include a query utility so that the query-report process is a seamless one.

In either case, with today’s database applications the process of designing a basic report is, well, pretty basic. It usually is a matter of choosing tables, records, and fields from a screen, then using a report template or simply moving elements on the screen until you have the data elements you want in the place you want them.

Data Types

We mentioned in our discussion of spreadsheets that you can store data of different types in a spreadsheet cell. The same is true of database programs. In the early days of computing we could store only text data and were glad to get it. As computers became more powerful and the software more sophisticated, support for a broader range of data types was added.

Although it is true that we still track a lot of textual information with database management programs - probably more text than anything else
- today's programs offer strong support for numbers, of course, and graphical information such as photographs. Programs such as FileMaker Pro from Claris are well suited to tracking visual data such as photographs of employees in a human resources database, for example, or real estate listings. You can use the graphics power of a product such as FileMaker Pro to build online catalogs that include product illustrations as well.

The really exciting part of this relatively new capability is the fact that the visual data - drawing or photograph - is stored within the database like other data elements. During the design of the database tables you specify one or more fields within a table’s records as a graphics field. Then as you enter information into the database you can drag-and-drop images off of your desktop or from a folder right into the record on screen.

You can also do a lot of data management similar to the work you might do in a spreadsheet. You can use a database to build a tracking system for projects that includes budget information, expenses, and so on. Database fields can contain formulas to calculate numerical relationships, like a spreadsheet. You can also do this type of calculation during the design of a report.

**Program Types**

Database management programs can be divided into two basic types: relational and flat file or non-relational. We have been discussing relational database programs so far in this section simply because more products today support relational data designs and because you’ll find them a lot more flexible.

However, there may be room for a flat filing program in your computing life as well. A flat filing program can’t relate information from multiple tables. You create a record structure that stores the data you want to track in a single table. If you were to design a contacts tracking database like the one we discussed earlier in a flat filer program, you’d
include all of the data elements from the two tables into one table. As we said, this design causes redundant data entry for some kinds of information - our contacts database is a good example. However if you are maintaining a simple inventory of the items in your home, there is no redundant data to be stored. If you’re maintaining a mailing list of friends and family or even sales leads, the likelihood of having to store redundant data is slim.

For these kinds of data management a flat file program is a good choice. They usually require less storage and other system overhead, they are easy to learn and to use, and they may operate faster than a more complex, relational program.

There’s one other database program design consideration of which you should be aware. That is the client server design. Increasingly, as network support for all applications becomes more common, database programs support this distributed processing model. Here’s a thumbnail sketch of how it works.

Let’s start by describing a typical data retrieval request over a network. Suppose you have a database server that resides on one Mac in a network and there are multiple Mac computers that access this central repository of data. If you are sitting at your Mac, attached to the network, and you create a query in the copy of the database software running on your Mac, the software forms the query and sends a request to the database server for a block of records. The software running on your desktop has no idea where in the database the requested record resides, and the server itself can’t know, so the server sends a block of information across the network to your Mac. The database software on your Mac searches this block of data. If the requested record isn’t there, your Mac requests another block. This process continues until the record is found. Note that all of the data is sent across the network so your computer can conduct the search.

Now let’s look at that same scenario in a client-server environment. You still have a Mac on your desk and you still run database software on
CHAPTER 21: CRUNCHING NUMBER AND MOVING DATA

it. There is still a database server somewhere out on the network and you still create a request for a specific record on your Mac. This time instead of sending whole blocks of the database file across the network for your Mac to search, the server software conducts the search on the server and sends back to your Mac only the information you requested. The amount of information that must be transmitted across the network is reduced, making the whole network run faster. And, because the remote database server is dedicated to managing these kinds of requests, the data retrieval or find operation itself probably goes a lot faster.

Mac Database Products

Here's a starting point to help you begin your research on Mac-based database management programs.

ClarisWorks Office: Claris - www.claris.com
Integrated office software suite. Includes spreadsheet and word processing facilities in addition to database tools.

FileMaker Pro: Claris - www.claris.com
Popular relational database program. Supports text and graphics. Can be used with TCP/IP communications to create intranet or Internet online databases. Strong general networking support as well.

Works: Microsoft - www.microsoft.com/works
Integrated office suite. Includes Spreadsheet, word processing and other office software in addition to database features.

Database and Web server support for the Mac. Database designs can be deployed to the Web automatically.

Butler: Everyware Software - www.everyware.com
Brio Enterprise: Brio Technology - www.brio.com 415-856-8000

Data Fountain: Dimensional Insight Inc. - www.dimins.com
Reporting and data management tool. Friendly user interface and multi-format data support. Cross-platform.

Visual FoxPro: Microsoft - www.microsoft.com/vfoxpro

Phyla Mainstay: www.mstay.com 805-484-9400
Relational database. Object-oriented user interface and development tools. Uses drag-and-drop to create relations.

Retriever II: Exodus Software - www.eos.net/exodus 513-522-0011
Flat-file data manager designed for small-business applications. Supports import and export to and from other data formats. Up to 16,000 records.
CHAPTER 22: GAMES AND TOYS

This chapter covers the various aspects of gaming on the Macintosh. We'll talk about how and where you can find games for the Mac, the differences between shareware and commercial games, the basic hardware needed to play the games, and the devices that enhance the computer's ability to run the games. Of course we'll discuss some of the games themselves.

Getting Started

First you need a Mac! If you're reading this you probably already own one. If not, get one. We help you make that decision in Chapter 2. If gaming is the thing for you, consider a Mac with at least 8 Mbytes of RAM, a 4X CD-ROM drive, and a processor running at 100MHz or faster. Older games can offer a lot of fun with less hardware, but if you want to stay with the mainstream and be able to enjoy today's current games, these are minimum values. As with nearly anything you do with your Mac, more and faster is even better!

For fun and successful gaming you'll probably want to add some game-oriented peripherals to your basic Mac. For example, a joystick, pedal controls, or possibly a trackball for that arcade feel are good gaming tools. The choice is yours, just choose whatever makes you comfortable and adds to the enjoyment of the gaming experience.
Where to Find Games

Computer games can be found in a variety of places. Start with your local software retailer, such as CompUSA (one aisle for Mac games in most stores), Babbage's (one shelf, on average), Electronics Boutique (probably one shelf), or similar retailers. You can possibly branch out and get lucky. Mac software is often hidden among the shelves of PC software, just waiting to be discovered. That's where we found *You Don't Know Jack*, shown in Figure 1-9 on page 14 of this book. There are catalogs such as *MacMall*, *MacWarehouse*, and *The Mac Zone* that cater to the Mac. Also check out Macintosh-oriented magazines such as *Macworld*, or *Mac Addict*. These magazines also contain good reviews of new software, not to mention other helpful information. Keeping a sharp eye out for the occasional close-out sale at retail stores can sometimes yield good results. Again, check out the PC software displays as well as the Mac tables. We find that Mac game software sometimes gets commingled with other stuff. If you are lucky, you just might come across a bargain on a game you've been looking for.

Computer trade shows can be helpful in locating games. Many game manufacturers set up displays with sales representatives and technicians present to answer questions and give demonstrations. You will usually find these trade shows advertised in your local newspaper or television when they are going to be in town.

Don't limit your investigation to computer-related shows. Amateur radio (ham) club meetings, hamfests, and swap meets almost always have a good selection of Mac software, including games. We've found software bargains at Saturday-morning flea markets and yard sales as well. The game market, more than the business software market, flourishes in out-of-the-way places. Games can be a volatile commodity as the players age, move, or tire of a particular set of games. When you attend one of these events bring along any games or other software you'd be willing to trade for a game. These events are usually big on barter.
If you have checked all these resources and can’t find a particular game, or you just don’t feel like getting out, go online and search. Game manufacturers have websites where you can contact them directly. You can download demos of some games, which can help you decide whether or not to buy the game.

See the links to Mac game sites in Chapter 23 for more Mac gaming information. Especially good is the site for networkable Mac games at www.ambrosiaSW.com/netgames/. This site not only features great Mac games that can be played against other real people, it also features links to download those games and a great deal of Mac networking support. Check it out.

**Shareware vs. Commercial Software**

Shareware is an affordable way of purchasing computer games. With shareware you can try out the game before you make the decision to buy it. The manufacturer, however, is trusting in your good nature and honesty to pay for it if you keep playing it. Many shareware products run in demo mode until you send in a registration fee. After payment is received you will be sent the registration number or serial number of the game, which will allow you full access to all of the game’s features. You can locate shareware programs on the Internet and download them directly into your computer. It would be wise, if you do this, to have some sort of virus protection software installed on your computer. Disinfectant is a shareware anti-virus program that is effective. Also you can purchase anti-virus software such as Virex from Datawatch or SAM from Symantec. Another source rich in shareware booty is the CD-ROM that accompanies the magazine *Mac Addict*. Of course friends also are a good potential resource for shareware.

The quality of shareware is varied. Some games are simple and basic while others may be fairly complex. Shareware games on the whole don’t posses the high-resolution graphics or smooth movement that CD-
ROM games have. They also don't have long and detailed plots like some of the CD-ROM adventure and mystery games, but neither do they carry the high prices associated with the high-end games. CD-ROMs pack more bang for the buck, but shareware loads faster on your computer, requires less RAM, and takes up considerably less space on your hard drive.

Something to keep in mind is the fact that some shareware hasn't had all the bugs worked out yet and can behave a bit erratic. Like, for example, crashing your computer. Again, you get what you pay for. If it doesn't work, don't pay for it!

Don't let this turn you off from shareware games. Even though some shareware is absolute garbage, others are very entertaining and well worth the nominal fee the author requests. A lot of classic arcade games have made their way into the shareware realm in one form or another. There are nearly infinite variations of games such as Asteroids, Tetris, Pac Man, and Pong.

The single best shareware manufacturer in the Mac gaming community today has to be Ambrosia Software. Visit their website at www.ambrosiasw.com and check them out. They feature a variety of Mac games from networkable shoot-em-ups to arcade and adventure games.

Hardware

The newer your machine, the more games you can play. It is wise to check out the game requirements on the box before you buy. If you have an older Mac, you may be better served by downloading your games. You'll find more older games online than on the store shelves. If there is little room on the shelves for Mac games in general, then there is even less for four-year-old Mac games.

You need to make sure your computer has enough RAM to operate the game. Many CD-ROM games will require you to turn your computer's
virtual memory off, and some games have a tendency to freeze-up momentarily while using virtual memory. It's best to have plenty of physical memory installed before beginning a game, and with the price of RAM much less than it was just a couple of years ago, it's a lot easier on the pocketbook.

Some games can run directly from the hard drive, while others require the CD to be in the CD-ROM drive. Logically the bigger the hard drive, the more games can be stored in your computer. Like everything else in the computer industry, the technological advances in hard drives are growing by leaps and bounds. It's hard to believe that not so long ago another popular gaming machine, the Commodore 64, was amazing! Now it is nothing special to see a computer with a 2Gigabyte hard drive or even a 4Gigabyte drive. And just around the corner are hard drives for home computers that will be measured in terabytes. You just gotta love it!

If the hard drive of your present computer isn't quite large enough for your gaming needs, investigate swapping out your present hard drive with a larger one. If you have a free drive bay add another internal drive to your computer or add an external SCSI hard drive. We tell you more about expanding your Mac in Chapters 11 and 15.

Generally, the more advanced your monitor, the better. Most Mac games are smart enough to adapt to the display you are using. In fact, the biggest problem may be playing older games that require fewer colors. You can change these settings easily in the Monitors & Sound control panel.

If you've been gaming for a while, chances are you're getting pretty tired of trying to fly around in an F-18 Hornet using the arrow keys, or worse, the mouse. Well then, it's time to get some gaming peripherals. A joystick can definitely improve the atmosphere of any flight-simulator game. Joysticks plug into the ADB mouse port on the keyboard. Gravis makes several nice joysticks such as the Blackhawk, the Firebird II, and the Mac Mousetick II. The Microsoft SideWinder 3D Pro is a new
Macintosh-compatible joystick that features 3D rotation to emulate rudder pedals. But if you want to go the extra light year and you have the cash, you'll go for a stick and rudder system or a cockpit shell that incorporates movement for the ultimate thrill.

If driving is what you're into, then you will most likely want to add a controller with a steering wheel and gas and brake pedals. A trackball is a handy little device for playing arcade-type games that originally used such devices. There are numerous trackballs with differing configurations on the market.

3D acceleration cards plug into the PCI slot located inside the computer's housing. These cards breathe life and vitality into 3D games. There is the Xclaim 3D, Radius TX-1152, and ATI 3D Extreme, just to mention a few. Be sure to check your machine's compatibility with a card before purchasing one.

Overview of Mac Games

A wide range of games exists for the Macintosh. You can find everything from educational and entertainment games for children to blood-and-guts battle games for adults.

For flying enthusiasts there are excellent flight-simulator programs with crisp and detailed graphics that mimic flight with a smooth and fluid movement. There are board games galore for those who want a calmer game atmosphere, and card and gambling games for people who just can't seem to get the time (or money) to go to Atlantic City or Las Vegas. For the strategic and tactically minded there are games to strain the brain to the breaking point. In the cyberworld of gaming, adventures await the bold at heart to take them to worlds once barely dreamed of. The following sections give you a sampling of some popular Mac games and a brief synopsis of each.
Adventure and Mystery Games

Santa Fe Mysteries, The Elk Moon Murders - Fear the Desert
Activision
This who-dunnit takes place in Santa Fe. You play the part of a detective tracking down clues as you trail a brutal killer. As you gather evidence and follow hunches, you race against time to find the murderer before someone else is killed, possibly you.

The Elk Moon Murders features Amanda Donohoe of L. A. Law, and was created by Virtual Murder Series producer Shannon Gilligan and Northern Exposure writer-producer Sam Egan.

I Have No Mouth, and I Must Scream
Cyber Dreams
What a great title for anything. And with a name like Harlan Ellison over it, you know what to expect. This psychological nightmare features five lost and tortured souls exploring their darkest pasts. They are doomed to be tormented forever by Am, a hate-filled supercomputer buried deep within the bowels of the earth. Strange and compelling.

Sam & Max Hit the Road
Lucas Arts
Join Sam (dog detective) and Max (the weird-looking bunny) as they track down a bigfoot that has run away from a carnival. A quirky, interactive, and animated CD-ROM.

The Dig
Lucas Arts
On a shuttle mission to stop a stray asteroid from striking Earth, three astronauts are zapped onto an alien world far away. Explore the planet, and try to uncover the how and why they were taken away.
Fall Out
Interplay
Roam about on desolate post-nuclear war wasteland where giant rats and other hideous beasts abound. A bit of advice: don’t punch any of your buddies in the game. They can get pretty nasty about it.

Prince of Persia
Broderbund
Tales of the Arabian Nights-style adventure game. The prince must rescue the princess from the clutches of the evil vizier. If you’re not careful, the prince tends to bang his head a lot and lets out an audible “uuhh.” And watch out for those pits, or you’ll get the point the hard way.

Search and Destroy Doom-Type Games

Marathon, Marathon 2 - Durandal, Marathon Infinity
Bungie
Board the spaceship Marathon and fight off the mysterious alien invaders. Try to discover their origins and purpose for invasion as you are guided along by the ship’s computer, all the while blasting the vicious invaders out of existence.

Marathon 2 and Marathon Infinity are more of the same with a few new twists. All three are a lot of fun.

Dark Forces
Lucas Arts
Great graphics and great action mark this Star Wars shoot’em up. In the first mission you are a participant in the events leading up to the events in the opening scene in the first Star Wars motion picture. A must for any Star Wars fan.

Descent and Descent II
MacPlay
Hang on to your stomach for this wild, head-rush of a ride through dark, alien corridors guarded by robot minions who fight to the death with no trace of human mercy.
Descent II features a friendly little guidebot to help you in your quest to rescue the hostages, blow the reactor, and get out. But watch out for the thiefbot! He is one nasty little sneak.

Simulator Games

F/A-18 Hornet
Graphics Simulation Corporation
This is one of the top-flight fighter simulations. Fly missions in different theaters of operation and even carry and deliver tactical nukes. Smooth and realistic feel makes this game an absolute pleasure to fly.

MechWarrior 2
Activision
Set in the distant future, two warring clans battle for the future of their world. Lumbering about in gigantic bipedal war machines they blast and maim all that stands in their way. The short movie at the beginning of the game is alone almost worth the purchase. This game also boasts an incredibly powerful musical score.

X-Wing
Lucas Arts
Great addition to the Star Wars series of games. Smooth flying and beautiful graphics add to this marvelous simulator game. If you’ve always wanted to fly an X-Wing fighter, this is a good chance to get a little closer to that dream.

TIE Fighter Collectors
Lucas Arts
Fly one of the bad guy’s ships in this latest release from Lucas Arts. It’s another fun one. Nice looking. Everybody needs to own a TIE fighter.

A-10 Attack
Fly the homely but deadly ground attack plane in a variety of scenarios. This simulation takes a little getting used to, since the handling of the aircraft is probably true to the feel of the real thing.
CHAPTER 22: GAMES AND TOYS

**Shock Wave**
Electronic Arts
An entertaining, futuristic air-combat game that pits you against aliens invading Earth. This game is very easy to learn and a lot of fun to play. Decent graphics and a lot of intense action keep this game from ever getting boring. Especially interesting are the *War of the Worlds*-like tripod war machines.

**Puzzle and Arcade Games**

**You Don't Know Jack Movies**
Berkeley Systems
This is a Q & A set under the premise of a very strange game show with a smart-mouthed host who seems a bit perturbed when you interrupt his monologue to get on with the game. The questions are about movies and are generally hilarious. A very funny game for one or more players.

**Dr. Brain**
Sierra
In an experiment gone awry, Dr. Brain has inadvertently transferred his mind into his lab rat, Rathbone. With the help of his niece, Dr. Elaina Brain, you explore and repair his bizarre brain.

**Pro-Pinball/The Web**
Macplay
This virtual pinball game has realistic look and feel. You may have to fight an overwhelming urge to nudge your desk or work station, but use the nudge keys on the keyboard instead. They work much better. But be careful and don't tilt it! If you're an old hand at pinball, you'll like this one.

**Shanghai Double Pack:**
**Shanghai II Dragons Eye and Shanghai Great Moments**
Activision
Ancient tile-matching goes cyber. These are peaceful and serene games that are much harder than you think at first. This set of games is easy to
learn but does demand a lot of concentration. There are many variations of this very relaxing puzzle game.

**Ultimate Pool 1.1**  
Quarter Note Software  
This inexpensive shareware game offers an easy-to-learn interface. It plays well and can give you hours of fun. It does not have any fancy 3D panning but the action is smooth. Offers a 30-day free trial. After registering you have access to all the games, but until then it runs only in demo mode. The demo is available on *MacAddict* CD-ROM for 15 Nov/97.

**Beat the House**  
MacPlay  
If you don’t have the time or money to get to Atlantic City or Las Vegas or just plain love casino games you’ll like this one. Even if you can afford to go to Vegas this game could come in handy in brushing up for the tables. It looks good and is easy to learn, which makes it an excellent tutorial for anyone wanting to learn how to play.

**Strategy and Tactics Games**

**Myth: The Fallen Lords**  
Bungie  
Myth is another offering from Bungie, the makers of Marathon. This is a cool-looking medieval strategy game with a new look, and has a hot 3D engine. Instead of being flat and board-like, as so many games in this genre are, it has rolling hills and buildings that you can almost reach into your monitor and touch. This no doubt will be the wave of the future for strategy games. What’s next, guys? Holograms?

**Warcraft I and II**  
Blizzard Entertainment  
Build empires, bring others down. Smash your foe into mulch and move on to expand your conquests. Not much action during the battling but the characters do occasionally have some interesting comments, espe-
cially if you keep bugging them for no reason. Ah, there's nothing like an ax to the head.

**Colonization**  
Micro Prose  
Sail the high seas and discover a new world. Conquer it, colonize it, declare independence. Do all those fun things our forefathers used to do. That's just one of several scenarios you can play out.

**Battleship**  
Shareware - MacAddict Oct.'96  
The popular game in shareware form. Works like the original.

**Kids Games and Education**

**Toy Story**  
Disney Interactive  
The hit motion picture is now a CD interactive animated storybook. This is a great CD-ROM for kids. It features amazing computer animation by those wizards at Pixar, and since everybody knows who Buzz and Woody are, enough said.

**Bricks**  
Gryphon  
Virtual Legos. Who would have ever dreamed of this? This actually looks like a good way to introduce children to 3D modeling and animation. They work just like real Lego blocks. It comes with your basic building blocks to assemble any way your imagination will allow. An interesting aspect to this piece of software is that you can do simple animations with it.

**Muppet Treasure Island**  
Activision  
Jim Henson's immortal Muppets romp it up in this delightful children's CD interactive. Nothing could be more fun for a kid than smacking an ever-lovin' Muppet in the puss with a crossbow propelled pie. There is a
demo of this game on the October '96 *MacAddict* CD. If you get a chance to check this out click your mouse on the gargoyles around the well and some of the other pieces of scenery in the surrounding area for some other surprises.

That's just a tiny, tiny fraction of the games and CD interactives available for the Macintosh hit the shelves each day, so keep your eyes open . . . and good gaming.
DON'T BELIEVE THE NAY-SAYERS. THE MAC PLATFORM IS ALIVE and well. You may have to work a little harder at finding resources, but they are there in abundance. Here is a list of websites, catalogs, retail­ers, magazines, newsgroups, and other resources for the Mac aficionado. Of course, over time these will change. Be on the lookout for new Mac­oriented resources. Haunt those newsgroups and scour those websites. Somebody adds something new everyday. If you aren't familiar with the Internet, then by all means, read Chapter 17 again, and pay close atten­tion to searching the Internet and subscribing to newsgroups.

To become a Mac guru in your own right, start attending your local user-group meetings. If there isn't one in your area, start your own. There are probably more local Mac resources in your area than you thought. Key resources for keeping the faith are the Evangelist mailing list, the Info-Mac newsgroup, *MacAddict magazine*, and of course www.apple.com. See how to get your own copies of these resources below. They have been gathered and sorted by type of resource. Look for notes and descriptions where available.

### Local Resources

If you don't already know anyone in your community using a Mac, then start hunting. You should be able to find local retailers and resellers who can point you to local user groups and other resources right in your home town or neighborhood.
User Groups

User groups are the best place to get help with your Mac. Attending meetings also allows you to get out and stare at something other than your computer screen. The problem is finding one. Most of the computer shops in your area can point you in the right direction, but if they can’t, try The User Group Connection at www.ugconnection.org. User groups may also offer a monthly newsletter. These newsletters can be great sources of news and information. Another benefit these groups provide is electronic bulletin boards that you dial into with your modem. These BBS or Bulletin Board Systems usually have a collection of shareware available as well as news and information on your local Mac community. In addition, the group meetings can be a chance to get shareware from other users and share reviews of the latest software.

Other Local Resources

You might want to check out the newsgroups buy.apple.com, var.apple.com, or aspn.apple.com for lists of resellers and Mac specialists in your area. Additionally, you can call 800-538-9696 and find your nearest Apple retailer. Any of these sources can point you to other resources in your area.

Don’t count out your national chain stores either. Many times Mac software will end up in the discount software bins. Also, you can find dozens of CD-ROMS with both Mac and PC versions of the software waiting in the PC-centric stores at your mall. Be sure to haunt the shelves.

Resellers, Retailers, and Other Services

So you need a Mac, but you live in a PC world. What do you do? Try these online, catalog, and telephone outlets. There are thousands of Mac retailers, and you can find quite a selection if you look. Don’t forget to
check the backs of Mac magazines (discussed later) for even more retailers.

Some of these companies produce catalogs that they'll send you for free. Others sell exclusively through the Web or by phone. There is a mix here of new, used, and refurbished retailers, so you are bound to find some bargains.

**Catalogs**

**MacWarehouse**
www.warehouse.com
800-677-8945
Provides sale prices on software and hardware for the Mac and IBM, customer service, education and government sales, and international sales. Online magazine provides a shopping basket for online ordering.

**Club Mac**
www.club-mac.com/
800-258-2622
Provides sale prices on Mac software and hardware. Weekly specials and Blowout specials on inventory that needs clearing from the warehouse. Catalog is also available by request from online site.

**Mac Zone**
www.maczone.com
800-304-0286
Provides sale prices on Mac software and hardware, clearance sales, customer service, online tech support. The online magazine provides a daily featured Mac product, specials, a free catalog and details on free software, a search engine for browsing and online shopping.
MacMall
www.macmall.com
800-222-2808
This catalog provides sale prices on Mac software and hardware products. The online catalog offers clearance sales, free downloads, online subscription to sales news, weekly specials, a search engine for browsing and online shopping.

MacConnection
www.macconnection.com
800-800-2222
This catalog provides sale prices on products for both Mac and PC. The online catalog offers information on corporate, government, and education pricing, order tracking, online shopping, two search engines, and a free catalog.

APS Technologies
www.apstech.com
800-304-7412
This catalog provides sale prices on Mac and PC software and hardware products. The online catalog offers weekly specials, online support, orders and status, and updates.

DTP Direct - Desktop Publishing
www.dtpdirect.com
800-311-7382
This catalog provides sale price on Mac software and hardware products. Online catalog offers online shopping, customer service, and a free catalog.

General Reseller

Bason Computer
www.basoncomputer.com
800-238-4453
CDW Computer Centers  
800-516-4239

CompuAge  
www.compu-age.com  
800-799-4622

CompuAmerica  
www.compu-america.com  
800-533-9005

Compu.D International Inc.  
www.compu-d.com  
800-929-9333

Computertown Inc.  
800-613-0622

CRA Systems Inc.  
www.crasystems.com  
800-375-9000  
Provides pricing for Mac machines including monitors, graphic cards, digital video, and printers. Has many older machines and last-year's models for reduced prices. Specializes in monitors and video cards.

Creative Computers  
800-222-2808

Infinity Micro  
www.infinity-micro.com  
800-589-1234  
Specializing in Power Macs, Performas, PowerBook Monitors, printers, Video Cards, Memory Apple Display monitors, Scanners, and Software.

J&R Computer World  
800-221-8180
LA Computer Center
www.LACC.com
800-689-3933
Specializing in Macintosh computers including PowerBooks, PC laptops, printers, monitors, accessories, and memory. Offering online ordering.

MacBase
www.macbase.com
800-951-1230
Offering specials on software and hardware products for Macs and IBM's.

Micro Outlet
www.microoutlet.com
800-801-4MAC
Offering products for all systems including software and hardware.

ProDirect
www.pdisales.com
800-524-9952
Provides Mac systems, raid systems, storage systems, monitors, printers, scanners, tape drives, Mac memory, and software updates.

Used and Refurbished

DataTech - Refurbished Macs
www.datatech-rmkt.com
800-281-3661

MacMarket
www.macmarket.com
800-223-4622
Provides weekly specials and blowout prices on all system hardware and software.
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MacResQ - Used Macs
www.macresq.com
800-447-3728
Offers new and refurbished Macintosh systems, complete parts inventory, and a large selection of Macintosh peripherals.

Mac Sale International
www.macsaleint.com
800-729-7031
Offers new, used, and refurbished Macintosh systems.

Mac Solutions - Memory
www.macsolutions.com
800-873-3RAM
Offers RAM upgrades, hard disks, and selected peripherals. Also offers used Macs, Power Macs, and PowerBooks.

Pre-Owned Electronics Inc.- Refurbished Macs
800-274-5343

Shreve Systems
www.shrevesystems.com
800-227-3971
Offering refurbished and new Mac equipment including Mac parts, video cards, PowerBooks, monitors, printers, accessories, and upgrades.

Other Goods and Services

The Chip Merchant - Memory
www.thechipmerchant.com
800-808-CHIP
Memory and CPU specialist for both Mac and PC offering technical support, international sales, and government and education pricing.
Eritech International
www.eritech.com
888-808-6242
Sells high-quality memory for all desktops, laptops, workstations, servers, digital cameras, fax machines, printers, and musical equipment.

ICN-Innovative Computing and Networking Inc.
888-889-2211

MacCPU - CPUs
www.macCPU.com
305-669-2933
Provides CPU upgrades for Macintosh and Macintosh clones.

MacWorks
www.macworks.com
800-711-8679
Provides Macintosh computers, upgrades, monitors, printers, accessories, audio video, storage, and network products.

MCE Powerbook Products - PowerBook stuff
www.PowerBook1.com
800-5000-MAC
Specializing in PowerBook products including hard drives, memory, and newer tech products.

Mediastore - Hard drives, CDRs
www.mediastore.com
800-555-5551
Specializing in recordable CD, including CD recorders, duplicators, CD-R multidrives, CD-R color printer, CD-R labeling system, JAZ systems, optical drives, audio hardware, audio software, media, and DLT drives.

MicroMac
www.micromac.com
800-600-6227
Provides hardware upgrades with one of the largest diverse lines of accelerators and memory upgrade products for Macintosh.

**PowerMax**
www.powermax.com
800-441-6977
Specializing in custom, high-end Macintosh equipment including peripherals and software. Also offers catalog through the mail.

**Source Technologies** - Memory and external devices
www.sourcetechnologies.com
800-900-4599
Specializing only in computer memory, hard drives, and processor upgrades.

**United CD Rom** - CDs
www.unitedcdrom.com
800-864-8334
Offering both Mac and PC software and hardware including accessories, CD-ROM drives, joysticks, modems, monitors, printers, memory and books. Can download software immediately off its page and follow the instructions to unlock full version.

So what does the author suggest? My three favorite Mac resources are *MacADDICT* magazine, *MacWEEK* magazine, and the Evangelist. Easy enough to find, head to www.macaddict.com and www.macweek.com for the magazines and www.lists.apple.com for more information on the Evangelist and dozens of other mailing lists. I have also been a subscriber to the mailing lists of several smaller used hardware and software dealers mentioned in Chapter 2 for years. It is amazing what bargains you will find if you look, and the ads in the back of *MacWEEK* are always my starting point.
Magazines

There are still dozens of Mac magazines out there, though your specific newsstand might not reflect the variety. Some are better than others, and some are fairly specific in their audience. Also look for occasional Mac-related articles in Computer Shopper, Byte, New Media, and the various desktop publishing magazines.

**Apple Magazine**
Apple Computer Inc.
1 Infinite Loop
Cupertino, CA 95014
408-996-1010
Apple company magazine provides product information, online customer support, new technology and research articles, and information on other resources online.

**MacAddict**
www.macaddict.com
e-mail to Webmaster: webmaster@macaddict.com or letters to the editor: letters@macaddict.com
MacAddict Customer Service
150 North Hill Drive
Brisbane, CA 94005
800-666-6889 or 415-468-2500
Fax: 415-656-2486
Magazine for Macintosh enthusiasts, includes articles on new products, news, reviews, classifieds, and a really cool CD-ROM disk with each issue covering the above as well as including games and demos.

**MacFormat**
www.futurenet.co.uk/macweb
macformat@futurenet.com
Future Publishing Ltd.
30 Monmouth Street,
Bath
BA1 2BW
(01225) 442244
Fax: (01225) 446019
UK source for news, views, and reviews about the Macintosh industry. This magazine can be found with a great CD-ROM in most larger bookstores.

Mac Home Journal
www.machome.com/
For subscription or information: e-mail: subscribe@machome.com
800-800-6542
Fax: 415-882-9502
Has news, product reviews, Mac tips and feature stories directed at the home user.

MacWeek
www.zdnet.com/macweek/
e-mail: Editorial office- feedback@macweek.com
Subscription:
Customer Service Department, MacWEEK
c/o JCI, PO Box 10634
Riverton, NJ 08076-0634
Phone: 609-786-8230
Fax: 609-786-2081
This is THE industry trade magazine. It covers news, reviews, product information, and feature stories.

MacWorld
www.macworld.com
Macworld
P.O. Box 54529
Boulder, CO 80322
800-288-8648
The premier magazine of the Mac community with up-to-date articles on
news, reviews, product information, classifieds, and feature stories. Recently combined with *MacUser*.

**MacTech**

www.mactech.com  
e-mail: cust service@devdepot.com  
Developer Depot  
P.O. Box 5200  
Westlake Village, CA 91359-5200  
800-MACDEV-1  
Fax: 805-494-9798

*MacTech* was developed initially as a forum for programmers and developers. Today, along with *MacTech Japan*, it has evolved into a premier news and information vehicle targeted at 50,000 programmers and developers in 64 countries. This magazine provides several regular columns, industry news, conference reports, reviews, MacTech Online, shortcuts, advertising and full source code listings available on the Web, floppy disk, and CD-ROM.

**Internet Resources**

You may have noticed those funny little sentences at the bottom of some of your favorite TV shows or commercials, well, here are some more that deal with all things Mac. Websites come and go with the wind, so follow these links at your own peril. Some of the better and more stable ones are www.tidbits.com, www.ograd.com, and all of the magazine sites. There also are Mac mailing lists. The lists, especially the Evangelist mailing list, are the best way to get up-to-the-minute Mac information.

**Official Apple Sites**

Look to these sites for the gossip straight from the horse's mouth. These Web pages have the seal of approval from Apple computer. You'll find news and updates and much more.
Apple Home page
www.apple.com
This is the Official Apple Computer website, which provides product information, reviews of software and hardware, special articles on product developers and new technology and research, resources online, software updates, special prices and rebate information, Apple Club information, and other Apple sites worldwide.

Mac Computer Support
www.info.apple.com
Apple Support information Web page, which provides software system updates, online technical support, support tools, an archive of previous software updates, latest news, product information, statistics, current ftp traffic, and a search engine for software and hardware information and updates.

Mac OS 8
www.macos.apple.com/macos8
Apple Support information Page - same as the Mac Computer Support Page.

Mac Software and Hardware vendors
www2.apple.com/documents/vendors.html
This page is the official Apple software and hardware guide for Mac OS including products available in retail stores, product catalog, online and directly from the publisher. Shareware and freeware are also available.

Help Sites
Help! I need somebody. Help! Not just anybody. Help! Won't you please, please, help me.

Power Mac Software Conflicts
www.manual.com/conflicts
Page for listing PowerMac software conflicts including links to other
Power Macintosh resources, and other sites related to software conflict and updates.

**Do-It-Yourself Mac**
www.macfixit.com
This page offers an archive for Mac fixes, a search engine, advertising, reports, links, a download library, and late-breaking news on software conflicts.

**Macworld: System 7.5.3 bugs and fixes**
www.macworld.com/exclusive/753patches.html
A straightforward page posting patches and fixes for system software. It also offers a search engine, message board, and software library.

**BMUG's Helpline Solution Page**
www.bmug.org/Services/Helpline/HLI-Scan.html
Extensive online page that allows you to search for fixes in Mac software and hardware. Provides wide variety of applications to search through.

**Mac Assistant Tips and Tutorial Newsletter**
www.users.mis.net/~macasst/
An online teaser for the electronic *Mac Assistant Tips and Tutorial Newsletter*. The theory here is that a newsletter should be more how-to information and fewer reviews, and that's what they deliver. Several helpful tutorials and a variety of Mac links are provided at the site.

**Software**
Looking for a few good applications? Look no further.
ClNet's sharewarehouse
www.shareware.com
This is an extensive page offering software, online events, news, weather, horoscope, market reports, game summaries, and a search engine for the page as well as the entire net.
Mac Software Archive
www.host.ots.utexas.edu/Mac/main.html
This is the University of Texas Macintosh freeware and shareware archive. Software here is available in a wide variety of categories.

The Macintosh Software Catalog
pubweb.nexor.co.uk/public/Mac/archive/welcome.html
This page offers an extensive Mac software catalog through the University of Michigan/Merit.

Powerbook Army
net-army.com/pba
Web page that presents the latest news and software related to PowerBooks. Available in American and Japanese versions.

News and/or Gossip
So, who is the CEO of Apple today? Find out with one of these links.

AppleLinks.COM
www.applelinks.com
Shown in Figure 23-x, this is the official Apple Web page for software fixes - listing news, software updates Apple computer news, and news from around the Web.

TidBITS
www.tidbits.com
Find the latest Internet-related Mac news and information here.

Apple Watch
www.applewatch.com
Keeping an eye on the news from Apple. Great source for latest articles on the Web.
**MacInTouch**
www.macintouch.com
It's a column! It's a website! It slices, dices, and dispenses Mac-oriented news, commentary, and information.

**Macworld Online**
www.macworld.com
The online version of the largest Mac magazine on Earth. 'Nuff said?

**MacWeek Online**
www.macweek.com/
Look here for what will be in the print version of *MacWEEK* next along with lots of news and info.

**Digital Apple**
www.digitalapple.com
A fantastic clearinghouse site for Mac news and information plus TONS of links to newer information and popular Macintosh resellers.

**Mac Games**

You can find dozens of magazines on PC or console gaming, but Mac game resources tend to be few and far between. Here are a few to get you started.

**Mac Gamer's Ledge**
www.macleague.com
A Mac-oriented gaming magazine featuring reviews of all of the Mac-specific bells and whistles.

**Inside Mac Games**
www.insidemacgames.com
A magazine devoted to the hardware and software to turn your Mac into a premier gaming powerhouse.
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Emulation.net
www.emulation.net
Remember your Atari 2600, Atari 800XL, Commodore 64, Pac Man, Sega, Game Boy, or Nintendo? You can have them ALL on your Mac!

HappyPuppy
www.happypuppy.com
Games for the Mac and the PC.

Networkable Mac Games
www.ambrosiasw.com/netgames/
If you can’t work up a real sense of competition going up against your CPU, then it is time you visited this site for an adrenaline-pumping, sweat-inducing plunge into the world of hunter and hunted, Mac user versus Mac user, and networked games.

Usenet Newsgroups

Usenet is a good place to appeal to the Mac gurus and get tips on a wide range of topics. There are thousands of them, and of the 300+ Mac newsgroups, only a few actually see a lot of traffic. Try the following newsgroups.

Buying and Selling
Horse-trading tends to be a major Usenet pastime. Look for some good deals in the following groups, but buyer beware. See Chapter 2 for more tips on buying and selling by phone, mail, and Usenet.
misc.forsale.computers.mac
misc.forsale.computers.mac-specific
misc.forsale.computers.mac-specific.cards
misc.forsale.computers.mac-specific.cards.misc
misc.forsale.computers.mac-specific.cards.video
misc.forsale.computers.mac-specific.misc
misc.forsale.computers.mac-specific.portables
misc.forsale.computers.mac-specific.software
misc.forsale.computers.mac-specific.systems
misc.forsale.computer.mac
biz.marketplace.computers.mac
comp.forsale.computers.mac
comp.sys.mac.wanted

You can find several foreign-language Mac groups on Usenet. I included the French one because they actually produce some nifty software. It's worth watching for product releases. There are others for Chinese, Dutch, and German Mac users as well.
fr.comp.sys.mac

If you are looking to champion the Mac, then check this group out, but you might as well dip yourself in kerosene first. The flame wars rage heavily on this group.
comp.sys.mac.advocacy

There are dozens of topics about specific applications or Macintosh uses out there. Here are a few general ones to check out for tips on specific topics.
comp.sys.mac.apps
comp.sys.mac.comm
comp.sys.mac.databases
comp.sys.mac.graphics

What would any computer be without a few games, right? The Mac has its share, and you can find them here.
comp.sys.mac.games.action
comp.sys.mac.games.adventure
comp.sys.mac.games.announce
comp.sys.mac.games.flight-sim
comp.sys.mac.games.marketplace
comp.sys.mac.games.misc
comp.sys.mac.games.strategic
The comp.sys.mac groups generally deal with all things Mac. Here are a few of the hardware topics.

comp.sys.mac.hardware
comp.sys.mac.hardware.storage
comp.sys.mac.hardware.video
comp.sys.mac.portables
comp.sys.mac.system

Thinking about programming? Look here for more information before you dive in. If you are already in over your head, you may find that glorious save in one of these groups.

comp.sys.mac.programmer.codewarrior
comp.sys.mac.programmer.games
comp.sys.mac.programmer.help
comp.sys.mac.programmer.info
comp.sys.mac.programmer.misc
comp.sys.mac.programmer.tools
comp.sys.mac.programmers.misc

Mailing Lists and Listserves

One of the most effective ways to get information is to have it mailed to you. That's the way magazines and newspaper subscriptions work. Finding the information is effortless. You just open your email. That is the idea behind ^^mailing lists. Some lists are like chain letters, and every message posted to the list goes straight out to the email boxes of all of the subscribers. Other lists are peered, meaning somebody else looks over the messages first, before they go out.

The two main skills you need to master are subscribing and unsubscribing from the list. Since these skills change from list to list, we can only show you a single example. You will need to follow the specific instructions for your list. Generally, you mail message to the list server or computer that handles the list.
Let's use the incredibly influential and amazingly useful EvangeList as an example. This list, created by Guy Kawasaki, is THE clearinghouse for the latest Macintosh-oriented Apple news, software news, and general computer information. To subscribe, you send a message to majordomo@public.lists.apple.com that contains a single line saying: subscribe evangelist.

On most lists, that's all you need to do to subscribe. On some lists, you may need to take an additional step to confirm your subscription. That is the case with the Evangelist. You will receive an email back that contains the line:
auth <auth_key> subscribe evangelist you@wherever.com

This line contains the confirmation of your subscription. It contains your email address and a code that only the computer running the list knows. This is an important way to protect people from being subscribed against their will. To confirm your subscription, just reply and make sure the line is included unaltered. If your email program adds a > or * to the front of quoted lines, delete it. The line:
>auth <auth_key> subscribe evangelist you@wherever.com won't work. Delete the > before you send.

Now you will start to get the messages from the list on a regular basis. You will also get a message containing important instructions on using the list. This welcome message covers topics like subscribing, message etiquette, and unsubscribing. Be sure to print it and keep it in a safe place. You'll be glad you did when you decide to unsubscribe.

You unsubscribe from most lists by sending a message similar to the one you sent when you subscribed. For the Evangelist, you send a message to majordomo@public.lists.apple.com that contains the line: unsubscribe evangelist. That's all there is to it. You are off the list.

**Apple's Mailing List Server**

www.lists.apple.com

This is the place to start. It lists dozens of Apple-hosted mailing lists along with other non-Apple lists. You'll find application-specific lists and other lists directed at the Mac user.
glossary

.X2
One of the competing standards for 56K bps modems, the other being K56flex.

10Base2
An Ethernet wiring standard that uses coaxial (2 conductor) cable. Networks based on 10Base2 are end-to-end networks in which all devices are connected along a single cable segment that is terminated at each end.

10baseT
An Ethernet wiring standard that uses twisted pair (8 conductor) cable similar to telephone wire. Networks based on 10baseT wiring are usually wired in a star or modified-star arrangement that uses a central hub to connect multiple computers, printers, and other devices.

AAUI jacks
Apple Attachment Unit Interface connector. AAUI is a 14-pin D-shaped connector that is used for Ethernet network connections.

AAUI transceiver
An add-on device that manages Ethernet traffic over the local area network through the AAUI port.

Active application
In a multiprocessing environment the program or application that has the focus (a programming term that means has the attention of the running program) or with which the user is currently interacting.

Active window
In a multiwindow environment, the window that is highlighted or that contains the active application.

ADB
Apple Desktop Bus. A universal data bus used for the Macintosh keyboard, mouse, and other I/O peripherals.

Adobe Downloader
A software utility that loads fonts to your printer. Supplied free with many Adobe fonts.
Adobe Type Manager
A software application from Adobe that helps users and other applications access a variety of typefaces (fonts).

ADSL
Asynchronous Digital Subscriber Line. See DSL.

Alert box
A Mac OS object that provides the user information about a running process or that asks for user input for a running process.

Alias
In Mac OS, an icon and associated instructions that represents a program, folder, or file. Users and applications can create aliases to make program management easier and to help group data on the Mac desktop.

Apple events messages
Messages from the Apple Events Manager, which lets applications send messages to each other.

Apple Guide
A component of the Apple comprehensive help system. Display the Guide with the ⌘ + ⌥ keyboard shortcut or with the help key on the extended keyboard.

Apple LaserWriter Utility (See Apple Printer Utility)

Apple Printer Utility
An Apple utility program that loads fonts into a printer.

AppleScript
A simple programming language in Mac OS that lets users and applications automate certain processes. AppleScript is a text-based interpretative language.

AppleShare
An Apple computer-to-computer communications protocol.

Application
Computer software designed for a particular task or for a series of closely related tasks. Developmental or programming software is used to design and build application software such as word processing, database management, spreadsheets, and so on.

Archival media
Storage media used for long-term storage of Mac programs and data. Archival media includes streaming tape, removable hard drives, magneto-optical drives, and high density floppies.

ASCII characters
American Standard Code for Information Interchange, a standardized method for representing basic alphanumeric data that can be read and displayed by a wide variety of computer programs and applications.
ATM
Adobe Type Manager.

Background printing
The process of sending data destined for a printer to a temporary location in RAM or on a hard drive where the relatively slow printer output is managed by the CPU in the background. This enables the printing application to finish a printing task relatively quickly so the user can continue interacting with the program instead of being forced to wait on the print job to finish.

Bandwidth
In data communications the speed with which information can be transferred. Usually expressed in terms of Hertz (cycles per second).

BBS
Bulletin Board Service. (See Electronic Bulletin Boards)

Bit depth
In color displays or color printing, the number of bits used to describe each dot or pixel of color. The greater the bit depth the better the color quality. Older hardware and software typically support an 8-bit color depth (256 colors), whereas newer hardware and software may support a color depth of 24 bits (16 million colors).

Booting
The process of loading the first series of instructions required to start a computer from a pow-
ered-down state. Booting (or bootstrap) instructions typically come from ROM. Once the initial instructions are loaded, the startup process continues by loading more instructions and data from a hard drive, CD-ROM, or floppy disk.

**Bridge**
In networking, an electronic device capable of communicating with two or more protocols or over two or more discrete networks simultaneously. Bridges can be used to connect a local area network to the Internet, for example.

**Browser**
A software application that enables access to the Internet or an Intranet application. The term browser usually refers to World Wide Web access and therefore supports hypertext markup language access to information. The two most popular browsers for the Mac are Netscape Navigator and Microsoft Explorer.

**Bulletin Board System -** See BBS.

**Buttons**
In Mac OS, onscreen objects that can effect software actions when clicked or double-clicked.

**Cable modems**
Hardware devices that enable cable television subscribers to receive Internet data over the cable medium. Not all cable providers support Internet service. Today these modems provide one-way data transfer only. A telephone line is still required for sending information from the user to the Internet service provider.

**Catalog tree**
A component of the volume directory. Tracks information about three file components, the header, the resource fork, and the data fork.

**Category 5 cabling**
Twisted pair, telephone-type wiring used for 10BaseT network wiring. Category 5 cables are designed with pairing and twisting that helps cancel interference from external sources and crosstalk among the cable pairs.

**CD burner**
A hardware device that can write to CD media.

**CD-ROM**
Compact Disk Read Only Memory, a computer-based application for compact disk recording media. The basic technology used in CD-ROMs is the same as used by music CDs. A CD-ROM drive can be used to run programs, store data, or to play music with the proper software applications.

**CD-ROM drive**
Compact Disk Read Only Memory. A hardware device that stores or reads computer data using CD technology.

**Cell**
In a spreadsheet environment, a location defined by the intersection of columns and rows. Cells hold individual spreadsheet data values.
Central processing unit
The main information processing chip in a computer. The Central Processing Unit, or CPU, manipulates information in memory, communicates with other computer components, controls information display and storage.

Characters per second
In impact or dot-matrix printers, a measurement of printing speed.

Charcoal
A popular Mac font, available with most versions of the Mac OS.

Chicago
A popular Mac font, available with most versions of the Mac OS

Click
The process of selecting an onscreen object by placing the mouse pointer over it and pressing the mouse button once.

Clone
Computer hardware that is designed according to specifications from the original maker. A Mac clone is a computer system that is Mac-compatible, meaning it runs the Mac OS and compliant Mac applications, but it is not made by Apple.

Close Box
An icon on an open window that closes the application window when you click it.

Coated paper
Special-purpose paper designed for high-end printing jobs that require very high quality. For example, papers with a white clay-based coating are frequently used in desktop publishing applications or to create originals that will be used to produce a large number of copies.

Collapse Box
An icon on an open window that collapses the application window when you click it.

Color matching
A pop-up menu option from a LaserWriter print menu. This choice lets the user specify where PostScript receives its color information for color printouts.

Column
In a spreadsheet, the vertical group of cells.

Communications Toolbox
A collection of resources used by a variety of applications for communicating across modems, the Internet, and LAN connections. These are plug-ins that reside in the Extensions folder. Used extensively by the Claris Corporation.
Compiling
The process of interpreting text program instructions and coding the results into computer language. A compiled program can be executed directly without the need of the program software in which it is written. Compiled programs generally run much faster than those that are interpreted as they are executed.

Computer
A calculating device that consists of a central processing unit, software, memory, storage, input-output devices, and a source of power.

Containers
A feature of OpenDoc that lets application developers group program parts into a finished whole. A container holds program parts that can then work together.

Contextual menu
User-configurable shortcuts to selected menu selections in a Mac application.

Control strip
Graphical menus that provide direct access to Mac applications and controls. You can use control strips to access screen resolution settings, audio CD players, and so on.

Corrupted file
A stored file that has become damaged, usually through a hardware flaw in the storage device or by external forces. Stored files can become corrupted during a power surge or when the computer is dropped or bumped very hard, for example.

Courier
A popular monospaced typeface, similar in appearance to an old-fashioned typewriter. Most Mac applications support Courier.

Cps
Characters per second.

CPU
Central Processing Unit.

Creator codes
Information stored in a Mac file that tells the System what application created the file. Creator codes track for each file what program created it and what kind of information it contains.

Daisy chain
A process of connecting multiple devices to a computer bus, such as SCSI (See SCSD). Devices in a daisy chain use an input and an output connection and, in general, any device in a daisy chain can be detected by any other device in the chain.

DAT
Digital Audio Tape, a device frequently used as a backup medium for Mac computer data. DAT is also used to record high-quality sound and music. Data fork - A portion of a Mac file. The data fork stores the actual information contained in a file. See also Resource fork.
Database
A collection of closely-related data stored in a computer format that facilitates easy retrieval and manipulation.

Defragmenting
The process of removing a fragmented condition on a hard disk.

Desk accessories
Utility programs first available in Mac OS versions prior to System 7. The desktop calculator and other utilities still survive as desk accessories.

Desktop DB
A component of the Mac Desktop File. The desktop DB file keeps up with what program created a file and what kind of information it contains.

Desktop DF
A component of the Mac Desktop File. The Desktop DF component keeps up with where files are stored.

Desktop file
A Mac component that tracks information about individual files such as what application created them. Contains the desktop DB and desktop DF components.

Desktop printer
A software utility that is integral to the Mac OS and that manages background printing operations.

Desktop
On a Mac, the main user interface screen. The desktop contains icons that represent programs, applications, disk drives, and other devices and objects. The user accesses these objects by choosing them from the desktop.

Development tools
Software applications that help programmers develop discrete program applications.

Device driver
Software that helps the Mac OS access specific hardware. Support for a broad range of hardware is built into the OS, but some printers, scanners, and other devices require special software to work properly. This special software is frequently called a driver.

Dialog box
An on-screen object that displays information for the user or asks the user for input.

Dialup Access
The process of connecting to the Internet, another online service, or another computer by using a modem, a telephone line, and communications software. Dialup users connect to the desired service only when they need to retrieve electronic mail or conduct online research. Dedicated users, on the other hand, keep their computers or computer networks connected to the online...
Digital Subscriber Line
DSL. A technology that supports high-speed data communications over standard analog telephone lines. Still under development, the technology potentially supports data rates of 384K bps and higher for Internet and other remote network access.

Digital Video Disk
A digital data storage technology that uses storage media similar to CD-ROMs but that can achieve many times the information storage density. This technology was first targeted for motion video storage and distribution. Its speed of access and storage density also make it extremely attractive for computer data storage and multimedia applications.

Dip Switch
Dual Inline Pins. A small switch that mounts on a circuit board in an integrated circuit socket. Dip switches are used for system configuration settings.

Directory
A storage location on a hard disk or other storage device that tracks the names, locations, and sizes of files stored on the disk.

Display font
A font designed for computer screen display as opposed to use with a printer. A few years ago most applications required two font sets, one for screen display and one for the printer. Today, this process is mostly transparent to the user since printers and displays support the same font set, or the application makes the conversion from screen to printer font automatically.

Display PostScript
A display PostScript font. See Display font.

Dither
A process of improving apparent image resolution or color depth by changing colors or shades of specific pixel or dot elements. If you load an image that contains more colors that the current application is capable of displaying, for example, the image may be dithered to simulate the original.

Documents
The data elements of many computer applications. Text or word processing applications create documents. We frequently call the data files generated by other applications documents as well.

Domain
A named computer entity on a network. A domain usually consists of multiple computers on a network with each computer further identified by name or number. World Wide Web addressing uses computer domains to provide access to specific data files and other online resources.

Dot-matrix printer
A printer that generates text and graphics elements by arranging a series of small dots in a particular order. By convention, older, impact printers have come to be called dot matrix printers.
In reality, virtually every printer is a dot matrix device even though the image may be transferred to the paper by other than impact mechanisms.

**Dots per inch**
A method of specifying the resolution or image quality of a dot matrix printer. The more dots the printer is able to print to the inch, the better it is able to faithfully reproduce the desired text or image.

**Double-click**
The process of choosing an onscreen object by moving the mouse pointer over it and pressing the mouse button twice in quick succession.

**Downlink**
The communications connection that moves data from the remote source to the local desktop computer. The term is frequently used with cable modem and satellite connections to the Internet, where it means information moving from the Internet to the desktop. See also Uplink.

**Dpi**
Dots per inch.

**Drag**
The process of moving an onscreen object by placing the mouse pointer over it, pressing the mouse button to grab it, then moving the mouse to move the object to another location.

**DSL**
See digital subscriber line.

**DVD**
Digital Video Disk.

**DVD-ROM**
Digital Video Disk Read Only Memory. A new-technology storage device designed for motion video and other multimedia applications.

**Dye-sublimation printer**
A printer technology that produces high-quality color images through a heat-transfer process.

**Electronic bulletin boards**
Local or regional online services that predate the Internet. Still used by software houses, hardware vendors, and user groups to exchange information with customers or members.

**Electronic mail**
Email. The process of exchanging text and other data over a computer network. Email is used on local area networks, wide area networks, and the Internet.

**Email**
Electronic mail.

**Emulate**
The process of making one computer system or application behave like another. Software running on a Mac can emulate an Intel-based (PC) operating environment, for example, enabling
the Mac user to run software designed for Microsoft Windows.

**Encapsulated PostScript**
PostScript printer instructions that are stored in a file. The stored instructions can be copied to a compatible printer to print the document or image defined by the PostScript instructions.

**EPS**
Encapsulated PostScript.

**Ethernet transceiver**
A hardware device that connects to a Mac to handle the Ethernet network traffic to and from the computer. See AUI transceiver.

**Ethernet**
A popular networking protocol used by Macintosh, UNIX, Windows, and other computer systems.

**Explorer**
A popular World Wide Web browser from Microsoft.

**Extension conflict**
Operational or memory conflicts caused by competing extensions.

**Extensions**
Mac software add-ins that enhance applications or that enable a program to use certain computer features or facilities. Extensions are usually loaded when the Mac is booted.

**FAQ**
Frequently Asked Questions. An online resource that attempts to answer common questions about a topic. FAQs are frequently written by individuals who volunteer their time and expertise to help others understand a topic. They may also be written by professionals at a software or hardware company to serve as a customer resource.

**Fast and Wide SCSI**
SCSI-2 interface that uses high-speed data transfer and a 16-bit data path.

**Fast SCSI**
High-speed SCSI 2.

**Fax driver**
Driver software that enables applications to use a modem as a fax machine.

**File fragmentation**
A process of storing file elements in noncontiguous sections of a hard drive. Fragmentation occurs as a file is edited and resaved. If the changed file won't fit exactly into the original location, then portions are stored elsewhere. The OS handles file storage automatically so it is not a user concern unless excessive fragmentation causes file access to slow down, in which case the file or the entire hard disk can be defragmented by storing files into contiguous locations.
**File server**  
A networked computer system used to store common files in such a way that all or only designed users and applications can access them.

**File sharing**  
The process of making files stored on a file server or peer computer accessible to one or more users.

**FileMaker Pro**  
A database management software program from Claris Corporation.

**Finder**  
The visual user interface component of the Mac OS. The finder uses icons and other visual cues to guide the user through many computer tasks.

**Firewall**  
A hardware and software device that manages and limits access to certain network segments. Firewalls are used with local area networks that are connected to the Internet, for example. The firewall limits what data can be retrieved from the Internet by LAN users and even what locations on the Internet are accessible by users of LAN-based computers.

**FireWire**  
IEEE 1394. A high-speed data bus. Firewire is particularly well-suited to desktop video and audio applications, but hard disks and other devices also are starting to use this interface.

**Fixed-size fonts**  
Fonts that cannot be scaled or sized.

**Floppy disks**  
A magnetic computer storage device that uses flexible media to hold information. The term can refer to the hardware that reads and writes the data and to the medium itself.

**Font ascender**  
In printing, that part of a character that rises above the baseline (eg: characters bdl).

**Font baseline**  
In printing, the line on which letters rest; characters gpjqu descend below the baseline.

**Font cap height**  
In printing, the height of the capital letters in a given typeface measured from the baseline.

**Font descender**  
That part of a character that falls below the baseline (eg: characters gipqy).

**Font descent**  
In printing, the maximum distance any character in a typeface drops below the baseline.

**Font families**
A font is one size and face of type. Electronic systems can create a family of characters from a single computerized font.

Font kerning
The process of fitting adjacent characters together to use space efficiently and to produce attractive lines of text. Kerned characters nest together, an n moving under the rise of an adjacent r, for example. The letter j can fit close to a preceding letter d, but the letter d can't move especially close to a preceding letter o.

Font Substitution
The process of choosing a print or display font that is close, but not the same as, the specified font in a document or application. Applications substitute fonts when the precise font used in the loaded document or file is not installed. Font substitution can produce documents that are almost indistinguishable from the original, or documents that are wildly different, depending on the original font and what fonts are available for substitution.

Font tracking
In printing, the way a string of characters is placed in a line. See also kerning.

Font width
The display or print width of a font.

Font X height
In printing, the height of the lowercase letters measured from the baseline.

Fonts
A collection of typefaces in a certain style.

Format
The process of removing directory entries on a hard drive or other storage device. This makes room on the drive for additional files, but the original data is not actually removed from the disk.

Fragmentation
On a hard drive, a condition that develops over time as files are stored, changed, and deleted. A fragmented disk has many files that are not stored in contiguous disk locations.

Frequently Asked Questions
FAQs.

Gateway
A computer system or other device that enables access to a network or network components.

Geneva
A popular Mac font.

Gig
Abbreviation for gigabyte.
Glossary: Mac Demystified

Gigabyte
A measurement of disk storage capacity. One gigabyte is one thousand megabytes or 1,000,000,000 characters of storage space.

Glossy paper
Coated paper with a shiny, relatively hard surface. Glossy paper is used to print photographs and other graphic material because the glossy surface accepts sharper printed images.

Glyph
The printed form of a given letter or character.

Gopher
An Internet navigation tool that presents the user with text-based hierarchical menus. Gophers preceded the World Wide Web as a data-access medium for the Internet.

Graphic user interface
GUI. A computer interface that lets the user choose program elements and features by using icons or other graphic objects instead of text.

Grid lines
In a spreadsheet, horizontal and vertical lines that define individual cells.

GUI
Graphic user interface.

Hard drive
A computer data storage device that uses high density, rigid platters as the storage medium.

Hardware
The physical components that make up a computer.

Help
Electronic-based text, graphics, animation, and sound that instructs users on techniques or procedures in using a program or application.

Helvetica
A popular sans serif typeface.

HFS
Hierarchical File System.

Hierarchical File System
A computer data storage system that uses a system of parent and child folders. The parent folder is named to indicate the type of data it will contain - word processing data, for example. Child folders are named to identify specific types of information within the general parent folder. Child folders within a word processing parent folder might be named letters, proposals, monthly reports, and so on.
Hinting
In printing, a method for an application to smooth and enhance a particular font.

Hit
Information found as the result of an online or database search. Each file, data element, or online site that matches the search criteria is termed a hit.

HTML
Hypertext Markup Language.

HTTP
Hypertext transfer protocol, the online protocol used to exchange information over the Internet.

Hub
A hardware device that connects multiple computers, printers, and other devices in a 10BaseT network.

Hybrid CD-ROM
A CD-ROM program or multimedia platter that contains material for the Macintosh and the PC-compatible platforms. Distributing software and other material in a hybrid format reduces production and distribution costs for manufacturers and developers.

Hyperlink
Text or other object on a World Wide Web page that points to another location within the current document, to another document at the current site, or to another Web site. Text hyperlinks usually appear underlined and in a contrasting color, such as blue.

Hypertext Markup Language
A programming language used to develop most sites on the World Wide Web.

Hypertext transfer protocol
HTTP.

Icon
An onscreen object that represents a computer program, application, or other resource. Users can access the resource represented by the icon by double-clicking it or by dragging other icons onto it. On the Mac desktop a picture of a garbage can represents the deleted items folder, for example.

IDE
Integrated Drive Electronics. A input/output controller standard used mainly for hard disk drives on the Macintosh and PC-compatible computers.

Inactive windows
In a multitasking environment, a program or application window that is not currently being used or that is not currently processing information. Also a window that displays information from a background process or the program that does not currently have the focus. An application window that is not currently being accessed by the user.
**Info box**
An information screen that provides details about the operation of a running program, including memory use.

**Initialize**
A low-level format (see format) that actually removes data from a hard drive or other storage device.

**Input device**
A hardware device that lets the user enter information into the computer. Includes a mouse, scanner, digital tablet, etc.

**Installer**
A software application that copies files and inserts required configuration information into appropriate Mac files to enable a new application. Installers are used to enable word processors, data bases, graphics programs, and more.

**Integrated Drive Electronics** - See IDE.

**Integrated Services Digital Network** - ISDN.

**Intel**
The manufacturer of CPUs and other chips used in Windows-based computer systems. Popular Intel chips include the 80486, 80586 (Pentium), and Pentium II processors.

**Interactive Multimedia Association**
An industry association instrumental in defining many facets of multimedia computers. In 1997 the IMA was merged with the Software Producers Association.

**Interactive**
An application that lets the user enter data or other information through the keyboard, joystick, mouse, or other input device. The program responds to this information in real-time to produce different information or a modified screen display.

**Interleave**
On a hard disk drive, the setting that determines how information is read from the disk. Expressed as a ratio. A 1:1 interleave means information is stored on the disk sequentially, one data block after the other. Other interleave settings specify how many data blocks separate contiguous pieces of information. Slower disk controllers and CPUs require larger interleaves to give the system time to read information from the disk and move it into memory.

**Internet Service Provider**
ISP. A company that supplies the hardware and software necessary to allow users to access the Internet by dialing into the ISP's computer network and server system.

**Internet**
A global computer network of networks. Individual networks are connected to each other over a complex system of long distance and local telephone cables to enable users to exchange email or files, to conduct real-time conversations via keyboard or microphone, and to share computer resources and information.
**Internet connection**
A physical connection of two or more networks.

**IP Address**
A unique, numerical address that identifies network elements in a TCP/IP network such as the Internet.

**ISDN**
Integrated Services Digital Network, a digital telephone line that supports two discrete telephone numbers on a single wire pair. ISDN also supports Internet or other data access at rates up to 128 Kbps.

**ISP**
Internet Service Provider.

**Jaggie**
A graphics artifact that results when an image becomes pixilated. The result is an image made up of uneven, ragged lines.

**Jumper**
See Dip Switch. Jumpers use removable pins or shorting bars to connect two pins of an integrated circuit socket. Used for system configuration settings.

**K56Flex**
One of the competing standards for 56K bps modems, the other being X.2.

**Keyboard shortcut**
A keystroke combination that produces the same result as choosing an icon or making a selection from a menu.

**LAN**
Local area network. A physical connection of two or more computers and other devices, such as printers, to enable communication among the connected devices.

**Laser printer**
A computer data output device that uses laser light to transfer electronic information onto a physical medium for printing on paper.


**Leading**
In printing, the total space required to print a line of text including the space before and after it. Printed lines typically include extra space around a line based on the type of material, the font used, and other factors. For example, text may be set at 11 points and the leading set at 13 or 14 points.

**Ligature**
A method of printing or displaying adjacent characters in some font families where parts of the characters are connected or attached. See Figure 8.7 for an example.
Line oriented
In electronic editing, a software application that can enter and change information only a line at a time. Older text editors and programming tools used line-oriented editing.

Lines per inch
A specification that shows how many lines of printed data appear in each inch of paper.

Linux
A freeware or shareware version of the UNIX operating system. Linux is available for a wide variety of computer hardware platforms, including Macintosh.

Live Objects - See Containers.

Local Area Networks - See LAN.

LocalTalk
An Apple computer communication protocol for local area networking.

Lpi - See Lines per inch.

Macros
Usually simple but potentially complex computer programs designed to conduct repetitive tasks by entering a simple keyboard or mouse command sequence. Macros are designed to be written or recorded by users, but modern application software frequently can support high level programming features that enable professional developers to build custom user interfaces and software functions.

MacWEEK
A popular Macintosh publication.

MagnetoOptical Drive
A high-density, magnetic storage technology that uses optical signals for read/write head positioning.

Mbps
Megabits per second, a measure of communication speed.

Mean Time Between Failures
MTBF. A figure, usually expressed in hours, used by equipment manufacturers to express hardware reliability. Laboratory tests and, in some cases, field experience, help manufacturers estimate how long a given piece of equipment will function before it requires repairs. Compare to Mean Time to Repair.

Mean Time to Repair
MTTR. A figure, usually expressed in minutes, used by equipment manufacturers to express the ease of repair of a given device. Design information and field repair experience is used to determine an estimated time required to repair equipment after a failure.
Media
The storage devices in a removable disk system.

Megabytes
One million bytes of data (1,000,000 bytes).

Mega - Short for megabytes.

Memory
RAM. Electronic storage used by the computer's CPU for temporary data storage and program execution.

Menu bar
An onscreen object that holds text connected to an operating system’s or application's features and functions. The menu bar normally rests beneath the title bar on the Mac desktop. Menu selections can lead directly to a program operation or cause additional menus or dialog boxes to appear.

Menu items
Individual selections that appear on a menu bar.

Microsoft Word
A word processing application produced by Microsoft Corporation. Word is among the more popular word processing applications for the Mac.

Millions of bits per second
Mbps or megabits per second. In online communications or storage data transfer, a measure of data communication speed.

Modem
A hardware device that converts a computer's digital data into analog information for transmission over a telephone line. A modem also converts incoming analog information into digital format before sending it to the computer.

Monaco
A popular Mac typeface.

Monitor
A hardware device that displays computer output. Most Mac monitors use cathode ray tubes (CRT), similar to your television, to present text and graphics data. Laptop computers and some desktops can use liquid crystal or other non-CRT technologies.

Monospaced font
A font where each character uses a fixed amount of space to display or print. Compare to proportional spaced font.

Motorola
A company that manufacturers most of the CPU and support chips for the Macintosh.
Mouse
A computer input device that lets you make selections from among onscreen objects by moving a pointer over the object and choosing it by clicking a button on the surface of the mouse.

MTBF - Mean Time Between Failures.

MTTR - Mean Time to Repair.

Multimedia Marketing Council
An association of computer vendors that was instrumental in establishing hardware and software standards for multimedia.

Multimedia
The merging of video, audio, graphics, and text in a multi-level, interactive computer-based production.

Native
A computer software feature, such as a font, that is intrinsic to the operating system or environment.

Navigator
A World Wide Web browser designed and distributed by the Netscape company.

Network cabling layer
One of the physical components of a network. The wiring that makes the physical connection among network components such as printers and computers.

Network
A physical connection of computers and other devices such as printers. Communication and control software that runs within each connected device allows devices to use the physical connection to share resources and information.

Networking
The process of using computers and other devices in a network.

New York
A typeface popular on the Macintosh.

Newsgroup
On the Internet, a store-and-forward discussion group where conversations, or postings, are grouped by topic. There currently are approximately 40,000 named newsgroups available over the Internet.

Nonproportional font
A monospaced font.

OCR
Optical character recognition. A computer software application that reads graphical material, such as a scanned document, and converts the graphical image into text that can be input to a word processor or text editor.
OpenDoc
A Mac OS open development environment designed to streamline application development and cross-platform application compliance. This joint effort between Apple and IBM was killed in 1997.

OpenType fonts
Standard fonts, based on the Microsoft TrueType fonts, that contain screen and printer fonts in a set.

Optical character recognition - See OCR.
Page-oriented - In text editing or word processing, a program that allows full-page information access, data entry, and editing. A page-oriented editor lets you move the insertion point anywhere on a page to input or change information.

Page Setup menu
In a Mac application, a menu that lets you define certain features of the onscreen or printed page. Normally you are allowed to choose between landscape or portrait orientation, set margins, specify header and footer information, and so on.

Pages per minute
A measure of printer output speed. Popular Mac printers today typically print pages at a rate of 2 pages per minute to about 16 pages per minute, depending on the technology. Higher-speed printers usually cost more than low-speed printers.

Palatino
A popular Macintosh typeface.

Parameter RAM
PRAM. Nonvolatile Macintosh RAM that is used to store system hardware and software settings.

Partition
On a hard drive, logical segments that present a large disk to the OS as separate physical drives. Partitioning lets you store different types of data on separate partitions, or to create a disk that can boot into multiple operating systems.

Password
A sequence of characters - numbers, letters, and punctuation - that uniquely identifies a computer user or one accessing an online service. Passwords usually are combined with a user identification name. The password and user ID together uniquely identify the user. Passwords limit access to computers and online services to the person or persons who have the proper authorization.

PC Compatibles
Virtually any Windows-based computer that uses an Intel CPU chip set. In the early 1980s IBM released a public desktop computer specification the company called PC for Personal Computer. Although IBM still manufacturers PC computers, by far the majority of desktop machines that use the PC design are built by other manufacturers.
PC-Card slots
A confusing term that means different things depending on the context. PC-compatible computers use expansion cards in much the same way as the Mac. Some PC models use PCI-bus-compatible cards, as the Mac does, while others use cards based on one or more other bus designs. Some manufacturers include PC-card-compatible slots in Mac expansion cabinets to allow the use of these cards. In addition, a relatively new expansion bus, originally named PCMCIA (personal computer memory card international association), has been re-named PC Card. This bus supports very small expansion devices including modems, network interface cards, hard disk drives, and more.

Peer-to-peer
In computer networking a configuration that establishes every computer as an equal. In peer-to-peer networking any computer on the network can access facilities of any other computer, assuming the user has been given permission for such access.

Pentium Processor
A 32-bit central processing unit popular in PC-compatible computers.

Phase-change thermal-wax printer
A type of color printer that uses hot melted wax to spray colors on the page a layer at a time.

Pixilate - The process of a graphics image becoming distorted as it is enlarged. A pixilated image displays details of the individual dots that make up the image.

Plain paper
In computer printing, a printer capable of using standard copier, bond, or stationery paper. The paper used in such printers. Most printers today use plain paper, though a few devices still require special coated or even thermal paper.

Platforms
A particular hardware type. Computer platforms are defined by their hardware design and by the operating system they use.

Plug-ins
Software that installs within another program or application to extend the functionality of the original software.

Point to Point Protocol
A communications protocol used for many modem-to-modem connections to the Internet.

Points
A measurement of font size. One point is equivalent to 1/72nd of an inch; a 72-point font is approximately one inch tall.

Pop-up menu
An additional or supplemental menu that appears when you choose a parent menu or icon within another onscreen object.
Pop-up window  
An information window or dialog box that appears as the result of a program function or user action.

Ports  
Physical connections that permit data exchange into or out of the Mac. Ports are used to connect printers, modems, keyboards, and so on.

**PostScript Interpreter**  
Software or firmware in a computer, printer, or other device that can translate the PostScript printer language. PostScript instructions are written in an English-like text language. When the instructions are interpreted the result is a printed or displayed version of the text or graphics material defined by the PostScript.

**PostScript**  
A printer or display language that defines program or application output.

**Powerbook**  
A popular Apple Macintosh laptop computer, available in several models.

**PowerPC**  
A popular 32-bit central processing unit used in many Macintosh computers.

**PPD**  
In a Mac application or OS, a printer definition. Applications present PPD dialog boxes so the user can specify various printer operational features.

**Ppm** - See pages per minute.

**PPP** - Point to Point Protocol.

**PRAM** - See Parameter RAM.

**Print queue**  
One or more documents or other program output stored in RAM or on a hard disk prior to being sent to the printer. Print queues are used to speed up application printing since output intended for a printer can move into RAM or to a hard disk file much faster than they can be physically printed.

**Print server**  
In a network, a computer that manages the print queue for one or more shared printers.

**Printer description**  
In a Mac application, the configuration and driver information that defines which printers are available and how they are set up.

**Printer drivers**  
Software that enables the Mac OS and other programs and applications to use printer hardware.
**Printer font**
A font description specific to a printer model.

**Privileges**
A set of specifications that determines which users can access a computer network, server, or workstation, and what tasks they are permitted to perform.

**Procedural Language**
A programming language in which program instructions are carried out in strict sequence where one instruction or set of instructions always follows another.

**Program linking**
In a networked environment, a setting that permits other network computers execute programs on your machine.

**Proportional font**
A font that uses variable spacing to display or print each character. The amount of space used is dependent on the shape of the character. A lower-case letter l requires less space to display that the letter B, for example. Proportional fonts produce printed documents that require less space than if printed in a monospaced font and they also have a more professional and pleasing appearance.

**Protocol layers**
In a computer networking environment, hierarchical software that controls various aspects of network operation.

**Protocol**
A set of software rules or conventions that allows computers and other devices to communicate across a network.

**Pull-down menus**
Supplemental or additional menus that appear when you click on a parent menu or choose certain objects within an application or on the desktop.

**QuickDraw GX**
An older Apple font that is still available as an optional install within the Mac OS.

**QuickDraw**
A popular Mac-based drawing utility.

**QuickTime**
A popular Mac application that manages, plays, and manipulates motion video, sound, and graphics files.

**Radio button**
An onscreen button that lets the user of an application select certain performance or functional parameters.
RAID
Redundant Array of Independent Disks. A multidisk storage device that provides high-speed data access plus fault tolerance. Especially popular among video, sound, and other multimedia producers on the Mac.

RAM fragmentation
A condition that can evolve in RAM (see RAM) as multiple programs execute and then terminate. Unless each program adequately frees up and cleans up the RAM it used, your Mac can begin to lose available memory until ultimately you are unable to run programs until you restart the computer. In a well-behaved program environment RAM fragmentation should never occur.

RAM
Random Access Memory. Electronic storage where Mac programs are executed, temporary data is stored, and data manipulation is conducted. RAM is volatile storage, which means the data is lost when power is removed.

Raster Image Processor
Hardware and software that rasterizes images and text fonts.

Rasterizing
The process of converting the mathematical definitions of fonts and other images into printed form.

Read/Write head
On a hard disk, CD-ROM, or floppy disk, the hardware device that moves across the storage medium to access stored information.

Relational design
A database design that uses multiple tables to define a complete data element. Related tables are logically linked through a common key, such as a company identifier.

Removable drive
A storage device that supports removable media.

Repeater
In a network environment, a hardware device that boosts signal levels for a long cable run.

ResEdit
A Mac System-level editor that lets you review and change applications.

Resolution
A measure of image quality. Expressed in the number of bits used to store the image.

Resource fork
A part of a Mac file. The resource fork stores all file information except the actual data the file contains. The resource fork may contain creator codes, menus, splash screens, and other information.
Resources
Hardware or software components available for use by a computer user, program, or application.

RIP - See Raster Image Processor.

ROM
Read Only Memory. Electronic storage inside computers, printers, and other electronic devices. ROM contains program instructions that are usually provided by the device manufacturer and which cannot be changed by vendors or users.

Row
In a spreadsheet, the horizontal group of cells.

Runaround
In printing, the space between a figure and the text that surrounds it.

Sad Mac
An onscreen display that indicates that a problem occurred during the startup or booting process.

Sans serif font
A font without serifs, character extensions that add definition and shape. Sans serif fonts are most often used for titles, posters, and other short text. Fonts with serifs are used for body text because text in serif font styles is easier to read.

Scanner
A hardware device similar to a copier that uses optical techniques to copy printed material into digital format so it can be used by a computer application.

Screen font - A display font.

Scroll bars
Onscreen objects that let you move up and down or side-to-side in an application window to display material that is too large to fit on a single screen or within the active window.

SCSI port
Small Computer System Interface. A input/output port common on Mac computers for disk drive, printer, and other device interface. An 8-bit interface capable of 5 Mbytes per second of data transfer.

SCSI-2
A 16-bit SCSI interface standard capable of 20 Mbytes of data transfer.

SCSI-3
A 16-bit SCSI interface standard capable of up to 40 Mbytes of data transfer.

SDSL
Synchronous Digital Subscriber Line.
Search engine
On the Internet or an intranet, a software application that helps users find specific information by searching titles, topics, and other data for specified information.

Sector
A subset of a hard disk track.

Serial ports
Macintosh input/output ports used to interface with printers, modems, and other external devices.

Serif font
A font that includes serifs, character extensions that add definition and shape.

Server
- On a computer network a device that is configured to manage specific functions such as a printer or file services.

Service bureau
An individual or company that performs services within a specific industry. A computer service bureau, for example, conducts computer processing services such as word processing, accounting, or database functions. A graphics service bureau may take a user's original art or photographs and turn it into computer files or could even generate original art.

Services for Macintosh
On a Windows NT network, intrinsic software that supports Macintosh computers.

SFM
See Services for Macintosh.

Shortcut
In a Windows environment, icons that represent an actual folder or program. Shortcuts are similar to Apple aliases.

Shutdown procedure
The process for closing Mac programs and turning off the hardware.

Size box
An icon on the lower-right-hand-corner of the Mac onscreen window that let you drag the window to a new size.

Sleep mode
A computer operational mode that turns off the display and reduces the power to other electronic devices. A computer in sleep mode appears to be turned off, but you can restore operation usually by pressing a single key or by using a specific keyboard combination.

Slider
The dial. An object on Mac windows that lets you change the value or certain onscreen objects.
Small Computer System Interface - See SCSI.

Software Publishers Association
A national organization that is working to establish multimedia hardware and software standards and specifications.


Spooling
The process of sending application output intended for a printer into a RAM or disk file temporarily. Spooling frees up an application quicker than sending output directly to a slow device.

Star topology
In computer networking, a physical arrangement that connects individual devices through a central hub or server in a star or spoke arrangement.

Startup chime
A sound played to indicate progress during the startup or booting process.

Startup Disk
A hard disk specified as the bootup or startup disk. In a single hard disk environment the one hard disk is automatically configured as the startup disk. If your Mac has multiple hard drives, you can specify which disk will be used to load the operating system information.

Startup Movie
A brief animated or motion video sequence that plays during the booting or startup process. You may have no movie, or you can specify which file will play at startup.

Startup process
The process of starting the Mac from a turned off condition. Startup involves turning on the power and having the system ROM load the operating system and other software required for operation.

Startup Screen
The screen or screens that display during the startup process.

Storage
Nonvolatile devices, including hard disk drives and floppy drives, used to store computer information or programs.

Straight text - See ASCII.

StyleWriter - A popular Mac printer.

Subscribe
The process of specifying which Internet newsgroup you want to read regularly.
Subscript font
A font specification used to display or print text configured as a subscript.

Superscript font - A font specification used to display or print text configured as a superscript.

System file
A program or data file used at the Mac system level to support operating system functions.

System fonts
Fonts that are part of the default fonts installed with the operating system.

System
An operating system, such as Mac OS 8.

T.A.R.D.I.S - Time and Relative Dimensions in Space. A fictional time machine forged by the Time Lords. For more than 25 years this time machine carried Dr. Who through time and space on the BBC. If the good doctor had a Mac, he could have gotten that chameleon circuit working.

TCP/IP
Transfer control protocol/Internet protocol. The communications protocol most often used in UNIX networks and the Internet.

Template
A data file supplied with an application that provides a starting point for designing a document of a specific type. Word processing software may include templates for reports or newsletters, for example. A database program may include templates for household inventory or accounting functions. Templates make the design of particular data types easier and quicker than if you had to start from scratch to design your own.

Text editor
A software application that conducts basic text manipulation functions. The resultant file is usually stored in ASCII (straight text) format.

Thermal-wax transfer
A printer technology that uses hot plastic film to place colors on the page one layer at a time.

Thumbnail
A small image that represents a larger graphics or photographic object. Displaying images in thumbnail size saves memory and screen space. Thumbnails can serve as shortcuts to full-sized, high-resolution files.

Title Bar
A bar at the top of an open window or application that contains the title of that window or application. Title bars are usually positioned on top of the menu bar.

Track
On a hard disk, concentric circles used as a logical division for data storage.

Trackball
A computer input device that replaces or supplements the mouse. A trackball consists of a rela-
tively large ball set on top of a base, a switch or switches that perform the mouse-click functions, and an interface cable that plugs into the mouse port.

Trackpad
An electronic pad that provides input to the computer and computer applications. A pen or stylus is used to select onscreen objects. A trackpad replaces or supplements the mouse as an input device.

TrueType fonts
Standard, scalable, outline fonts used by Apple and Microsoft that can be used for display or printing. TrueType standards enable applications and the files they produce to work well in a cross-platform environment and across applications.

TrueType GX fonts
A font that shipped with QuickDraw GX. Includes support for ligature.

TrueType Open font
A font standard developed by Microsoft that supports screen and printer output in a cross-application environment. See OpenType.

Type 1 fonts
Early PostScript fonts that offered improved versatility over fixed-font technology.

Typeface
A distinctive shape and design of type that makes a collection of letters recognizable. Typefaces are identified by name such as Times Roman, Helvetica, Palatino, and Century Schoolbook.

Uninterruptible power supply
UPS. A hardware device that supplies power for computers and other electronic hardware via rechargeable batteries. In the event of a power failure the UPS circuitry takes over so rapidly that the connected device doesn't see a power interruption.

Universal resource locator
URL. On the Internet or an intranet, an addressing scheme that permits browser and other software to locate a specific site.

Uplink
In an online environment, sending data from the desktop to the online host. See downlink.

UPS - See uninterruptible power supply.

URL - See universal resource locator.

User name
Sometimes called the online name. A sequence of characters that identifies the user who is using a particular computer or online host.

Vi - A UNIX-based text editor.
Video conferencing - The process of viewing and interacting in real-time with other persons over
a network. Video conferencing over the Internet is becoming a popular application for this global network.

**Video RAM**
VRAM. RAM onboard a computer's display adapter used to form and storescreen images. Video RAM may use the same technology as system RAM, or it may be special, high speed, RAM design specifically for video display applications.

**Volume bitmap**
A map of the Mac hard drive that tracks which portions of the disk have been used and which are free to store new files.

**Volume information block**
Defines the disk structure on a hard disk, including the names of files, file sizes, and disk size. Works with the volume bitmap during file creation and deletion.

**VRAM** - See Video RAM.

**WAN**
Wide Area Network. A network that extends beyond the local environment to include multiple buildings or even multiple cities.

**Web browsers**
Computer software that lets you connect to and view graphical, interactive information over the Internet or an intranet.

**Web**
The World Wide Web, a logical arrangement for data storage, access, and display over the Internet.

**Wide Area Network** - See WAN.

**Window**
An onscreen object that displays information or output from a program or application.

**Windows NT**
A 32-bit Microsoft operating system designed for network servers and desktop workstations.

**Wizard**
A small computer program that guides the user through program or application processes such as configuring the program, creating documents, and so on.

**Word processor**
A software application that helps the user create and edit documents that contain text, graphics, and other objects.

**World Wide Web** - See Web.

**XDSL**
X Digital Subscriber Line. There are multiple configurations of digital subscriber lines, including synchronous (SDSL) and asynchronous (ADSL). The term XDSL frequently refers to all DSL technologies in a general way.

**Zip disks** - A relatively high-density storage device from Iomega used by Mac and other computer users. Zip disks use floppy storage media encased in a firm case. Each 3.5-inch disk can store up to 100 Mbytes of information. Zip disks are available in printer (parallel) and SCSI interface versions.
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Uncover the powerful new features in Mac OS 8:
- Master the versatile multithreaded Finder
- Learn how Contextual Menus bring menu bars to every icon
- Use desktop pictures to redecorate your Mac environment
- Speed up your work with spring-loaded folders
- Turn any icon into a button and launch applications with a single click
- Open the online world with Web Sharing and Open Transport

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