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## µLaw Compression Format
*See*
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# MacApp

MacApp is the grandfather of all Macintosh **programming frameworks** . It evolved from the Lisa Toolkit framework, written in Clascal (Pascal with classes) used to develop software for the Mac's predecessor, the **Lisa** . MacApp was first introduced by Apple in 1986. At that time, the **C++** programming language had not yet caught on to the extent it has today, and most of the programming for the Macintosh was done in the **Pascal** programming language. As a result, Apple developed MacApp using a special **object-oriented** version of Pascal known as Object Pascal.

Over the years, Mac development has moved away from Pascal, and so has MacApp. Version 3 and later are written in C++ and take advantage of many C++ language features not available in Object Pascal. Because many developers have a large investment in Pascal MacApp programs, the older version of MacApp still has a large following.

MacApp is a mature and feature-rich programming framework. It includes excellent core functionality, including great memory management and human interface handling. After a period of slowed development, progress

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on MacApp has picked up significantly. Recent releases of MacApp have added a slew of new features. Applications created using MacApp can take direct advantage of PowerTalk, Macintosh drag and drop, and scripting support. MacApp is also slated to support **OpenDoc** in the near future.

Because most of MacApp is a single, large class hierarchy focused on creating applications, it is difficult to use just a part of MacApp for small projects such as Control Panels or **code resources** . For larger projects, however, the overhead is less of a factor.

***See Also***
C++; Framework; Object-Oriented Programming; Pascal

# MacBinary File
***See***
Encoding Files

# MacBrowse

MacBrowse is a source code **browser** from Apple. It is distributed with the **MacApp** application **framework** , but it is not restricted to browsing only MacApp code. MacBrowse follows the familiar multi-pane window approach to browsing **object**-**oriented** code (see following figure).

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The upper-left pane displays each class in the current project. The top center pane displays the member functions of the currently selected class, while the upper-right pane shows the data members. The large remaining pane is the editor, where the currently selected function is displayed.

Editing code in a browser such as MacBrowse can make it much easier to see the relationships among various parts of an object-oriented program. Rather than viewing and editing code based on its arrangement on disk (file-by-file), a browser shows code by its logical arrangement. The actual file associated with any given bit of code is of secondary importance.

***See Also***
Browser; Framework; MacApp; Object-Oriented Programming

# MacFrog

Educational **HyperCard** program for junior high and high school students, from Intellimation. MacFrog simulates dissecting a frog, without any of the mess, smell, or cruelty to amphibians. The program includes quizzes on the skeleton and the circulatory, digestive, and reproductive systems, as well as animated explaining various functions. If the goal is to teach frog anatomy, this program does it as well as, or better than an actual dissection. If the goal is to teach science in a "hands on, explore and document your findings" manner, the experience of doing the dissection is as important as learning the inner workings of the frog. But there's room in the classroom for both

types of learning, and MacFrog is a good alternative for those students who may not need or want to get their hands on a real frog.

Students with access to the World Wide Web can dissect a virtual frog, courtesy of Lawrence Berkeley Laboratories. It's found at:

> http://george.lbl.gov/itg.hm.pg.docs/dissect/info.html

and includes MRI scans, X-rays, and scholarly discussions on various aspects of frog anatomy.

***See Also***
Internet, Educational Resources

# Machine Language

Machine language is the set of digital instructions understood by a microprocessor. This instruction set is the only language any computer can deal with at its most basic level. In order for a computer to use a program written in any other language, such as C++ or Java, the program must first be translated into machine language using a **compiler** or interpreter.

Each type of **microprocessor** has its own unique machine language. Families of related processors, such as the PowerPC family, use nearly identical instructions in their machine languages. This way, programs created to run on one PowerPC chip can run unmodified on another. Similarly, most programs that run on one member of the 68000 series, used in

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earlier Macs, run just as well on another.

On the other hand, unrelated processors use entirely different instruction sets. In other words, the instruction set for a Power Mac's PowerPC processor is entirely different than the set for a Quadra's 68040. The following table demonstrates this difference. On the left is the 68K machine language for a simple routine that handles part of the memory initialization for a Mac application. On the right is the equivalent PowerPC machine language.

Note that these numbers are written as **hexadecimal** , in which the letters A-F are used to represent digit values of 10-15.

In order to run programs in one instruction set on another kind of processor, a special program called an **emulator**  is needed to translate the instructions from one instruction set to the other.

Programs are rarely, if ever, written directly in machine language. This is because the instructions in machine language are just a series of digital numbers. Higher-level languages are designed to put a friendlier face on programming by providing a human language vocabulary. The closest thing to programming directly in machine language is **assembly language** , in which each machine language instruction is given a short mnemonic that is used in place of the actual digital instruction.

***See Also***
Assembly Language; Compiler; Emulator; Hexadecimal; Programming Languages

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## MacHTTP
***See***
WebSTAR/MacHTTP


## Macintosh Common Lisp
***See***
Lisp


## Macintosh Computer Family

Apple Computer introduced the first Macintosh computer in 1984 with much fanfare. This was to be a "computer for the rest of us," and as such, was designed as an all-in-one unit containing everything Apple's engineer's considered important to an individual user.

The "Macintosh128K (see the following figure) was "luggable," weighing about 20 pounds in a compact footprint. Its chassis contained an **8-bit Motorola 68000** processor, nine-inch monochrome **monitor** , one floppy **disk drive** , 128 kilobytes (!) of **Random Access Memory (RAM)** , a **mouse** , a **keyboard** , a built-in **networking** capability, and a revolutionary operating system fully integrated with the hardware. It was the resulting **graphical user interface (GUI)** and its intelligent connections to the

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computer hardware that made the Mac unique. The 128K Macintosh was concise and complete.

You could not open the computer's chassis to add cards, although you could use its **Small Computer System Interface (SCSI)** port to hook up an external hard drive or another floppy drive to increase its storage capacity. You could also print information on a high-quality **dot-matrix printer** connected to one of its two **serial ports**. There was no other upgrade path built into the machine.

Apple has come a long way since that day. Today (as of this writing in early 1996), the Macintosh family has evolved into a multitude of models to fit the many needs of its over 20 million users. Macintoshes come in several flavors:

1.  All-in-one box systems, such as the Performa 5200 or Macintosh Classic. These computers have pre-selected components giving you no choice as to size or power of your display, hard disk, or expandability, but providing exceptional price/performance.

2.  Modular units that offer many choices, because the only thing that comes with the Mac is the computer processor. Apple has designed many different configurations of RAM, displays, hard drive capacities, and add-ons such as fax/modems. You choose a Mac by choosing the configuration (by model number) that fits your needs. Your Mac supplier can add additional RAM, other peripherals, and so forth, to further customize your Mac.

3.  Portable units that are light-weight (about 6 pounds or less) and run with power from a battery pack or ac/dc plug. Mac PowerBooks and Duos, like the modular Macs, also come in many configurations of CPU type, RAM, hard disk size, screen size and type (for example color or monochrome), and add-ons (such as a fax/modem), but all use a track-pad or track ball in the place of a mouse, include PC card slots for adding additional memory, a modem, and so on.

Within each of these Macintosh categories lie many different feature sets. Yet, all Macs provide many usability features not found in the PC world:

*   Since 1984, the Mac has offered built-in networking for easy connection to Apple's **AppleTalk** local area network. More advanced Macs, including all of the **Power Macs** , provide further connection to the faster **EtherNet** network that has become a business standard.

*   All Macs connect to grayscale or color displays to varying degrees of quality. Many Macs support high-grade **8- or 16-bit color** directly, letting you display millions of colors on your monitor without the use of an additional video card. With the addition of a video card, your Mac can display 24-bit color.

*   All Macs provide some expandability for added processing power. Most compact and lower-cost Macs offer a **Processor Direct Slot** (**PDS**), sometimes called an **LC Slot** . PDS slots are fast, but because of their dependence on the Mac's CPU, do not support a standardized architecture, so are expensive to manufacture, since each Mac chip

requires a separate type of card. The mid-range and high-end models also provide a **NuBus Slot** that, although slower than the PDS architecture, provides a standard architecture which is not dependent on the CPU, so has more following among third-party vendors. The most recent Macs provide a new standard slot used in the PC world, called **PCI**, that is faster than NuBus, and also provides a standard architecture. The PCI bus enables Macs to use more third-party vendor cards (with the proper software drivers).

- All Macs provide high-quality sound input and output, with most providing 16-bit stereo quality sound fidelity. Some Macs provide special features that can be used to **process audio-visual input and output signals** (called **AV** in earlier Mac models). These AV features also enable modern Macs to **recognize speech** and support extensive telephony systems.

**Conversation with Frank Casanova**

Frank Casanova helped Apple expand its Mac product line with screamers such as the Mac IIfx. Casanova was laid off, hired back, and now, as director of the Exploratory Products Laboratory for the Advanced Technology Group, he helps Apple figure out where it fits into the future.

**Maclopedia:** How did you first encounter the Mac?

**Frank:** I was working at Apollo Computer, a workstation manufacturer in the Boston area, in 1985. Somebody bought one at Apollo. We all took

turns taking it home. It was a Mac 128KB; you were constantly swapping floppy disks. I remember bringing it home: it was unbelievably novel. My wife and I set it up on our dining room table, and it beeped and smiled, and in a few minutes, we were drawing and typing. I thought, what an unbelievably simple machine to use, and so elegant, but hobbled from the point of view of a workstation technology. Then I realized it had the same microprocessor we had in our workstations. Apple had taken all this performance and aimed it right at the user. It did what you wanted, and put the user first. In the workstation world, we put the process first and told the user, "We'll get back to you when we are ready." It was a revelation.

**Maclopedia:** So how did you find your way to Apple?

**Frank**: Through "MacWeek" magazine. At Apollo I was product manager for desktop workstations, and we added an IBM PC bus, to encourage an after market. There was none at the time, absolutely zero; there were huge expensive applications but no developers. So we put this bus into the machine, and when we did that, some of the PC magazines picked up on it, saying, "Here it is, perhaps, the crossover machine from the workstation arena." Well, it turned out not to be, but MacWeek did an extensive interview. The folks at Apple read it, and they were thinking about starting a high performance group. Apple knew very little about high performance architecture, and how to market it. I wasn't making the decision about the microprocessor, but my job would be to rally the troops and set up a product group that would kick off with the

first high performance Mac.

The first time Apple called, I said no; my family is from the East Coast, and we were going to stay there. Then they called in April. The day had started off nicely, and I parked my new sports car outside, where I could see it out my window. But the weather changed. Now my car was covered with a solid inch of ice, and Apple called.

I asked, "What's the weather like out there?" And my future boss said, "It's 70 degrees, and sunny," and I said, "FedEx me the tickets."

I went home and my wife and I went out to California. I accepted the job the same day we bought a house.

**Maclopedia:** Did you experience culture shock moving from Apollo to Apple?

**Frank:** You know, I interviewed from early in the morning to late in the day, and everyone asked me the question about culture. What they had found was that a lot of people were blown away by the lack of organization. A lot of people cannot exist in that environment, so a lot had quit. They pressed pretty hard on that point. I'm glad I didn't work here as my first job because

I appreciated the unparalleled and uncontrollable growth, the passionate, intense hours, and they were long, but it was like a six billion dollar startup.

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They handed you a length of rope, and you could make incredible things with it, or you could hang yourself with it, and a lot of people hung themselves with it. And there was a star system, and if you could use that to your advantage you did really well, you had great projects assigned, but if not, you were lost. I did get to take advantage of it, and have fun, and introduced a few products.

Actually, I canceled the first couple of projects because they were addressing Apple's historic problems rather than future opportunities. In the late '80s, various "skunkworks" were under way, [projects] not sanctioned by management, but we kept some activity going in the backroom that wasn't on the product platform. The skunkworks machine was fraught with risk; we were never quite sure if all the pieces would work together, but all the cards fell into place, and the Mac IIfx came out. That was my first machine. It redefined what a high end Mac was, pushed the envelope of compatibility and performance. For instance, we pushed the SCSI performance. That was part of what made the fx truly the first wicked fast Mac. The "wicked fast" expression was mine; it had been part of my normal conversation in Boston, and I was giving a presentation, and I said, "This is a wicked fast Mac," and it stuck. It took on a life of its own, and the project became big, larger than life, and dragged all of us along.

**Maclopedia:** How about the 040 line?

**Frank:** We started the 040 project because Motorola had begun making some

real progress, and we got some samples. We started off with what turned out to be the Quadra 900, but over time we realized that we could get the 040 design to support a smaller, more personal machine, so we could introduce a whole family of products—and we could bring out more than one Mac at a time.

**Maclopedia:** How did you come up with the name Quadra?

**Frank:** We were sure that the Quadras were not Mac IIs. They had new metrics, EtherNet built in, VRAM-based video, a whole new architecture—enough of a leap not to call them Mac IIs. So would it be "Mac Insert Word Here?" such as Mac Classic? We saw how well Acura had done, so we hired a naming company and went off for a few days and hung posters of awesome technology on the walls, like Apache helicopters, and did word association games, and narrowed down to a couple that were worthwhile perusing, and Quadra was the one that evolved.

**Maclopedia:** And how did you move to multiple Quadras?

**Frank:** We decided that doing multiple machines within a product line, the 900, and 700, at the same time meant not forcing people to pay the most for a high end machine. We broke our own price performance curve.

**Maclopedia:** So why did you get laid off?

**Frank:** I joined the Power Mac team, but I didn't want to be a computer manager. I became the Futures evangelist, finding new ways to use the

PowerMac. Then 1993 happened. I wasn't laid off; it was a drive-by shooting. Lots of people got laid off for no particular reason. I was not one of the most important characters adding value. My promise of added value was months away. I didn't hold the people who laid me off in bad regard. The day they handed me a check for eight months pay in one hand, I got three offers of jobs at Apple in the other. I said, "Let's talk in five months." I went out and did consulting, traveled the world, but consulting is a lot of work. I have a lot of respect for consultants now.

**Maclopedia:** And what are you doing at Apple now ?

**Frank:** I came back to Apple in the Advanced Technology Group. They wanted someone who had both feet on the ground in real-life product experience, to strengthen what the lab was doing, to strengthen relations with the product divisions, and to use my presentation prowess to evangelize and get a lot of attention for our group. So I created this new group, the Advanced Technology Evangelists, looking toward the future, but not just six months or a year away, more like the next three to five years, and we brought messages back to the group, too.

Then that got old, and we repurposed me. I am a director now, and my group is called Exploratory Products. The role of my group is to smash bits of technology together and try less than traditional techniques, new interfaces, new integrations, slam an antenna on that, build

twenty of them, and see what people think. My job is to break the rules of technology and supply new experiments. We tell our researchers to break the rules. We try to find out what the researchers want to do research on, and to find out what platform they want to build on, while building strategic relations with developers and leveraging the work in other labs, sharing, and trading, and leveraging those other technologies. I also manage the business plan because we can add a dose of reality to an otherwise surreal group. I do manage a group called Futurists, too, who predict social and cultural trends, and tell me where society is going to be in five years and how we can predict what we will win with.

**Maclopedia:** Is the Newton part of Apple's future?

**Frank:** Yes. The Newton was a technology that was a year or two too soon. If we brought that out today, it would be an unbelievable hit. But it is tough to change a first impression, so we have some work. But we are basing a lot of our research on Newton because we believe in the architecture; it's small, portable, with an interesting kernel, and none of the baggage of the Mac OS. The Newton is poised for a comeback.

Apple classifies Macintoshes by processor type, consumer purpose, and market placement, which makes it very difficult for the layman to figure out which Mac is which. In addition, Mac models change based on the inclusion of cache to increase processing speeds, floating point processors for rapid mathematical computations, audio-visual processors to assist in real-time AV

processing, and display adapters to ease the attachment of appropriate monitors. Macs also contain faster or slower versions of the same processor chips, as well as different RAM and hard disk configurations. The variety of offerings has become bewildering.

The following table can help you sort out which Mac fits your particular need.

The Macintosh Family

| Mac Type | Model Names / Characteristics |
| --- | --- |
| Desktop Models | Power Mac 6100, 7200, 7500, 8500, 9500 / Stand-alone computers that include CPU, FPU, hard drive, 8 or 16M RAM, CD-ROM drives, 2 serial, SCSI, ADB ports, Built-in LocalTalk and Ethernet, 16-bit stereo input/output ports, system software, and mouse. Monitor and keyboard sold separately. |
| Consumer Models | Performa 580, 630, 630 CD, and 630 DOS Compatible, 631 CD, 636 CD, 640 CD DOS Compatible, 5200 CD, 5215 CD, 6116 CD, 6200 CD, 6216 CD, 6220 CD, 6230 CD, 6300 CD / Performas are the same Macs as desktop models but packaged as total systems that include color display (except the 636), keyboard, mouse, CD- |

ROM drive, 2 serial, SCSI, ADB ports, and built-in LocalTalk. Some models also provide either external or internal fax/modems. All Performas come bundled with extensive software and CD-ROM titles.

| | |
|---|---|
| Education Models | LC 580, LC 630 DOS Compatible, LC 6100/66 DOS Compatible, 5200/75 LC, and the 5300/100 LC / Similar in configurations to the Performa models but lacking the bundled software. |
| Portable Models | PowerBook 190s, PowerBook Duo 280c, Duo 2300, and various flavors of 5300 / Light-weight laptop or dockable computers containing either a grayscale or color display, 8M RAM, hard drive, built-in LocalTalk, floppy drive (except Duo), 2 PC card slots, 16-bit stereo input/output ports, system software, and trackpad. |
| Workgroup Servers | Power Mac 6150, 8150, and 9150 / PowerPC processor, DRAM, Level-2 cache, hard drive, CD-ROM drive, built-in Ethernet, Apple RAID software and other client/server software bundles, DAT drives. |

**Out With the Old and In With the New!**

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Apple has a habit of discontinuing older models without fanfare whenever they introduce new models (typically in August and January). Therefore, the model numbers mentioned in the table above are as accurate as possible as of the printing of this book. The information for the table is taken from Apple's current (as of February 1996) product list.

According to the Apple Product List of August 28, 1995, the following Macintosh models have been discontinued: Color Classic, LC 475, LC 520, LC 575, LC III, LC 630, Quadra 605, Quadra 610, Quadra 610 DOS Compatible, Quadra 630, Quadra 650, Quadra 950, Quadra 660AV, and Quadra 840AV.

The Performa models are especially vulnerable to change, because vendors receive configurations and associated model numbers according to their specifications. Thus, the particular models and configurations you find at one store may be significantly different from those which you find at another.

***See Also***
Consumer Models; Desktop Models; Duos; Education Models; Internet Servers; Laptops; LCs; Performas; PowerBooks; Power Macs; Quadras; Workgroup Servers

# Macintosh Culture
***See***
History and Culture of the Macintosh

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# Macintosh Easy Open Setup

If you don't have the application that created a document, Easy Open enables you to open that document with a different application. Let's say, for example, someone in your office gives you a document created in Word Perfect, but you don't have Word Perfect installed on your system. When you **double-click** the document, instead of getting a dialog box telling you that you don't have the program that created the document, you get a dialog with a list of programs you have that will open the document. If you have Microsoft Word installed, you could select it to open the document that was created in Word Perfect from the Easy Open **dialog box.**

In the Macintosh Easy Open Control Panel, you can toggle automatic document translation on and off. And you are presented with three options in the Translation Choices dialog box section of the control panel. The first checkbox asks if you always want the Easy Open dialog box displayed when translating a file. The second checkbox enables the Macintosh to easy open search for and/or launch applications over a network server (if you're connected to a network), and it enables you to choose to have Macintosh Easy Open automatically open the document if there's only one choice of application to open it with, which saves you a trip to the dialog box. You also can click a checkbox to have text documents automatically translated. There is also a button to delete all of your preferences.

To use the Macintosh Easy Open Control Panel, follow these steps:

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1. Select the Easy Open Control Panel from the Control Panels submenu on the Apple menu (or System Folder).

2. Click the On button (the default).

3. Choose your translation choices from the checkboxes on the left side of the dialog box. Choose always show dialog box if you want to pick the application to open the document from a list of applications, rather than having Macintosh Easy Open open the application of its choice.

If you're on a network and want to enable Macintosh Easy Open to search the server for the missing application and/or launch that or a similar program, from the server, check the "include applications on servers" box. If Macintosh Easy Open only finds one application that will open the document, you can click "Auto pick if only one choice" to keep the dialog box from opening.

***See Also***
Dialog Box; Double-Click; Server

# Macintosh Filing System (MFS)

When the Macintosh was introduced, the Macintosh filing system (MFS) kept all files on the same level, even though **folders** visually separated files. If, for example, you were in an application and used the **Open** command to open a document, every document on your drive appeared in the Open **dialog box** ,

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not just the files in a selected fold. In 1987, Apple replaced the MFS with the improved **hierarchical filing system   (HFS)** , which puts the contents of folders on different levels, enabling real separation and organization of Macintosh files by the user and by the computer.

***See Also***
Dialog Box; Folders; Hierarchical Filing System; Open

# Macintosh Games

***See***
Entertainment

# Macintosh, Leaving on All the Time

There's a old theory you may have heard, that some people still subscribe to, which suggests you should always leave your Mac on because it's better to leave your hard disk running all the time than to stop it from spinning and then restart it the next day. These people are afraid of **head crashes,**  which are extremely rare, especially if you use any care at all with your machine, but still (a) I don't buy it, and (b) I can't find anything official or even semi-official on it.

***See Also***
Head Crashes

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# Macintosh, Listing System Version

To see a listing of your Macintosh Operating System (MacOS), select **About This Macintosh** from the **Apple menu**. This opens a window displaying the version number of the installed System software. (The most current version, as we go to press, is System 7.5.3.)

To list the current system version, follow these steps:

1. At the desktop, select About This Macintosh from the Apple menu.

2. The version number of the installed system appears in the About This Macintosh window.

If you are in an application, and go under the Apple menu to choose "About This Macintosh," that heading is replaced by "About this application," which usually gives you the version number of the application, the serial number, and often times redisplays the application's splash screen that appears when the application is launched. Often times credits for the software programmers will appear here, too.

***See Also***
About This Version; Apple Menu

# Macintosh Office, the

***See***

# M

Networking

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OPERATING SYSTEM

The Macintosh OS has changed many times in the past years, evolving into a finely tuned instrument with features beyond what we might have imagined a few short years ago.

**System 7.5** is an update to the Macintosh operating system that introduces a range of enhancements and new technologies, along with the usual bug fixes and performance tweaks.

**Conversation with Chris Espinosa**

Chris Espinosa, Apple employee #8, has been with the company since the garage. He's developed software, operating systems, documentation, hypertext, and media applications for the Apple II and Mac. Here he reflects on the changes he's seen.

**Maclopedia:**  What was your earliest contact with Apple?

**Chris:**  It was 1976. I was a high school student. Jobs had dropped out of college and gone to work at Hewlett-Packard, and Woz had come back to Hewlett-Packard from Reed, and they had both gone to the same high

school I did. I went to the Home Brew Computing club and met Steve Wozniak there because he lived closest to me and could give me a ride. They met on the second Wednesday of every month, up at Stanford, and it was a long ride.

I had been going around during that summer to the first half a dozen computer stores that opened in the summer of 1976, like the original Byte Shop. I spent whole days going from one to another on the buses up and down El Camino Real, playing with the machines until someone would get irritated enough to throw me out.

One machine I really enjoyed was the Apple I, because it had a keyboard and a screen instead of lights and switches, and I got to program in the advanced hex system, not binary. And one day I was writing machine language programs on an Apple I, and this guy came in with a tape, and kicked me off the machine, and loaded the tape on the machine, and that was Apple BASIC, and he offered me a job testing the Apple II that was in preparation. So I started working in December '76 in the proverbial garage, doing the final testing on the Apple II BASIC language. Then we incorporated in January 1977, and I was hired in as employee number eight.

**Maclopedia:** Didn't you pull together some of the original documentation?

**Chris:** Yes. The original documentation for the Apple II was stuff people wrote up and Mike Scott gave to his secretary, Sherry Livingston, to quick print in batches and snap into report covers. And every week or

couple of weeks, the content was different. There were probably 20 or 30 versions of the mini manual, and he got tired of it, and he finally went around and rifled through everyone's desks, and found write-ups, and schematics, and had them all bound together in the Red Book, including a couple of things I had written up, like on how to write games and how to make shapes. But it was really haphazard. So when I graduated from high school, Jef Raskin gave me the assignment to write a decent reference manual for the Apple II as my part-time job in college.

So I took computer science and English at Berkeley, and wrote a two hundred-page reference manual on software and hardware; everything. I got access to the university UNIX system and did all the typesetting, and I didn't know that this was unusual, and I also didn't know that if you are being paid by the hour, the faster you work, the less you get paid, so at the end of that term, I came home from college with a knapsack full of dirty clothes, and camera-ready boards for the *Apple II Reference Manual.*

In the summer of 1981, I stopped college, and went to Apple full time. I wrote a lot of the books for the Apple III. Then Steve Jobs called me in and said, "I want to make you this deal. I have this great project, the Mac. Come work as the publications manager. I will pay you $40,000 a year. It will only take a year, then you can go back to college, and I will pay your tuition." This was his promise. Well, 15 years have gone by, and I still haven't gone back to college. But I took that job. I hired a

group of people to do the original Macintosh documentation, some of whom were twice my age, but they put up with it.

I wrote the first couple of chapters of what turned out to be *Inside Mac* and the *Human Interface Guidelines*, and what was wonderful about working on the early Mac was that before, in the Apple II and Apple III, our normal political boundaries between groups—that is, you are doing documentation, and we are doing software; you do your job and I will do mine—broke down. There was a tremendous sense of a group working together. Everyone had a right to be an expert on software design, user interface, how the books were written, and how the hardware was designed.

So when you did some work for the Mac project, you were obligated to run it by everyone in the division, even finance or human resources, and you had to respect the opinion of everyone in the group, even people who had no expertise in the field. That made the project appealing to a wide range of people. I have never seen that since, except there was a little of that in HyperCard. That so many really strong experts could come together and submit to the expertise of ordinary people was really wonderful. A lot of that was Andy Herzfeld and Burrell Smith and Steve Jobs wanting to make sure that everyone was respected for their input—unless they were bozos.

**Maclopedia:** How was it working with Steve Jobs?

**Chris:** He had legendary high standards. I haven't worked for him for well

over ten years, and I really have a ton of respect for what he has done with NeXt and Pixar. He has shown the stick-to-itiveness that he didn't show at Apple. At Apple everyone respected him for his vision and his drive, but his attention span was a real problem. I am really impressed that with NeXt he has taken an overblown vision and made it into a real working company.

He could be a real pain in the ass to work with because he had very high standards for visual esthetics, and things that were not good enough were sent back repeatedly to get better, until there was almost a fear bordering on paranoia about doing something that would meet his disapproval. That is why the Mac had such an impact on the visual arts community. Like we use the same icon in the manual as on the screen as is molded on the case; that kind of continuity. And the hideously arduous process of picking the graphic look for the machine, ending up with the Picasso Mac look that has lasted a very long time and was immediately captivating. The results have certainly been impressive, but being in the process was pure torture. In Steve Jobs' division, good enough wasn't. That takes a toll on people. But it worked. It was sort of self perpetuating. If Steve wouldn't let you get away with shoddy work, you wouldn't let your coworkers either. That lifted all of us.

**Maclopedia:** How has the Mac changed over the years?

**Chris:** The Mac product is a substantially different piece of technology than

it was in 1984. The change has been so slow as to be imperceptible. People forget that while Steve had some of the key original visions, and pushed them, like the graphic user interface, and the Mac office idea for the Laser printer and the file server, and the overall aesthetics of the Mac, Steve and most of the Steve followers left before the Mac Plus was introduced. Steve and Andy and Burrell and Mike Murray and Bob Bellville, and most of the management team, and the key technical visionaries were all gone in mid '85. And what was left was a bunch of Apple II and Lisa people to pick up the pieces.

And while Steve Jobs had the Mac vision, it was Jean-Louis Gassée's Mac that became the product. The product was a lot more pragmatic and a lot more computer-y than Steve Jobs' Mac. Alan Kay and Jef Raskin still correctly criticize the successful Mac as way too complicated and too much like a computer. That happened when the others came in. They opened up the Mac and let it be a machine for hackers to be creative with. That allowed the Mac to live.

If we had had another two years like 1984 and 1985, with slow adoptions, slow third-party support, and an overwhelming reputation as a toy computer, the Mac would be tremendously different; we would not have multimedia or desktop publishing, for instance. It was the creativity of the programmers getting into the box that made that happen. This is what Gassée is doing with Be labs; he is creating the dream box for programmers, and it will just emerge. He is probably not wrong. But the cost is that in many ways what programmers had to put

up with, originally, got foisted on Mac users—system extensions, error codes, having to manage the contents of your system file, having 294 control panels. It's just not as simple as what we wanted it to be. God bless the MacOS team. They try so hard to do the balance between simplifying enough so it feels like a Mac and putting enough power in there so it can be a useful computer.

Sometimes the way the Finder has evolved, and drag and drop, are so beautiful it's poetry when it all comes together. And some things, like file sharing, never make it to the level of simplicity. You might as well put in a command line and make it hard but clear. Like what is the difference between propagating and inheriting permissions? I don't understand that.

When Steve Jobs left to form NeXt in September of 1985, the Mac program was a total disaster. It was a bunch of the B players from the Lisa team who came in and shipped the Mac Plus and the hard disk and finally got a machine that had the power to run PageMaker and pump bits to that LaserWriter. Then we had a product, but not until then.

**Maclopedia:** So the Mac got its start in desktop publishing. What other areas did the Mac enter early?

**Chris:** There are some places where Mac got in early and really stuck; they are the heart and soul of the Mac. One is higher education, the college students. Joanna Hoffman and Bud Colligan really got the Mac into the lifeblood of higher education and made it the college student thing to

do to have a Mac. What you do in your rebellious youth is turn up your nose at your Dad's Lincoln and IBM PC and get a Volkswagen bug and a Mac. One of the wonderful things about college is that they are a standing wave of culture. The Mac has a lot of sustenance there.

And one thing that was really obvious, forever: kids really love the Mac. There's a program called Keywaks: any time you click the mouse or hit a key, it puts a colorful picture on the screen. It's a busy box. It takes over the whole screen. It's passed from parent to parent for eighteen-month olds. It's just wonderful. I brought home a Mac prototype in 1982, a couple of years before we shipped. One of my girlfriend's nephews, who was 5, didn't eat Christmas dinner; he learned MacPaint by himself.

Kids love the Mac. When we introduced the Mac, Apple IIs dominated K through 12. By getting developers to develop for the Mac, we managed to roll that over into all Macs. Schools are really slow to change, but elementary schools love us, and colleges love us. The publishing industry we don't have to worry about and multimedia, even though Windows is increasingly capable. People in art departments tend to prefer using the Mac, even if Windows has the same power.

People keep talking about a declining market share and no developers, but computers are different from soaps and autos, where you have to make sure you have the support. But if we keep technical parity and keep the Mac character, a lot of people just love the Mac. Some

scientist at Lawrence Livermore Labs, where the government is threatening to take out the Macs, he said it is like cutting off my right hand, you can do it, and I can still do my work, but I won't like it, and why the hell are you doing it?

**Maclopedia:** How's the Mac's relationship with big business?

**Chris:** The Mac has always had a tenuous relationship with big business. They like to go with the winners. Apple and the Mac have always been the underdogs. Some companies like going with the underdog, but then they complain that you are not the winner. One of the things that I have warned about is that the college strategy hurts us in business because when you graduate and get a job, you trade in the VW for an Acura, the backpack for a briefcase, blue jeans for nicer slacks, and the Mac for a PC to fit into the business world.

So there are a lot of people in business who really love us, and I think the Mac has more to bring to business because it is about doing things in a more efficient manner. The Mac makes it easier to use a computer than not to use it, and with Windows, that ain't so. But business has this love of standards and conformity and desire to embrace complexity. It's the nature of a large organization to embrace complexity, and that's why large corporations embrace Windows and reject Mac. It's standard and it's hard.

I think DOS and Windows are a conspiracy among the computer priesthood of the mini and mainframe computer age to keep job

security because the Mac was threatening to reveal that computers didn't have to be hard after all.

The new features of System 7.5 included:

- A built-in **hierarchical submenu** for the **Apple menu** activated through the **Apple Menu Options Control Panel** , which enables you to toggle the submenu feature on or off. It also add up to three folders to the Apple menu that contain **aliases** of the most recently used documents, applications, and servers, so you can relaunch a document, application, or remount a **server** without searching for the files themselves.

- An electronic version of post-it notes called **Stickies** , which enables you to have on-screen notes in your choice of size and color.

- Macintosh's **Drag and Drop** technology, enabling you to drag and drop items between applications, including the Finder.

- A new version of the **NotePad DA** that adds a host of new features and functionality, including drag and drop, the capability to create longer notes, and print notes.

- The capability to use **AppleScript** to automate certain tasks of the Finder.

- A total re-work of the online help system called **AppleGuide** , which offers interactive on-screen help and walks you through features and

functions.

- A greatly improved **Find function** , with more flexibility and a new interface.

- A **menu bar clock** that incorporates into the new **Date and Time Control Panel** . The menu bar clock is a reworking of the widely popular **shareware** menu bar clock extension SuperClock that was a staple on many users' machines.

- A larger collection of **desktop background patterns** utilized through a new utility/application called Desktop Patterns.

- A larger and updated **Jigsaw Puzzle DA** that enables you to copy and paste your own **PICT** graphic into the DA to use as a puzzle.

- An alias of the **Control Panels folder** that appears on the Apple menu itself and enables you to have instant access to individual control panels when the Apple menu submenus are activated.

- A new **PowerBook** feature called the **ControlStrip** ; a thin, floating palette that enables one-click access to a range of commonly used PowerBook features.

- An updated **Scrapbook DA** that accepts sound and video clips. The Scrapbook also gives you on-screen info on the items it contains (such as dimensions of the file, size of the file, format of the file, and so on).

- A **Numbers Control Panel** to enhance the Mac's use in foreign

countries. This control panel enables you to configure the Mac to display numbers and currency in popular foreign formats. There's also a **Text control panel** enabling you to choose from different text formats for languages that write from right to left, top to bottom, and so on.

- The **WindowShade** feature that started life as a popular shareware utility. WindowShade enables you to roll-up a window so only its **title bar** is showing, much like you would roll up a traditional window shade, by double-clicking the window's title bar, even within applications. WindowShade's options are accessed through the WindowShade Control Panel.

- An enhanced ability to make multiple selections with a marquee (**clicking and dragging** with the **arrow pointer** cursor produces a rectangular marquee around objects in active windows). Now you can use the marquee to select items in a **list view**, rather than just the **icon view**, as in previous versions of the system.

- A freeware extension called the **Extensions Manager**, which was created by an Apple employee but not officially supported by Apple. This extension enables you to choose which extensions load into your system at **startup** and to create sets of extensions for different purposes or users.

- A new control panel called the **Auto On/Off control panel** that enables you to set a startup and **shutdown** time for your Macintosh,

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even if you're not there.

- The **QuickDraw GX** extension, which adds a wide array of printing, font management, typographic, and other features, including a new printing architecture that enables you to have printer drivers on your desktop where you can drag and drop items to be printed. QuickDraw GX incorporates a version of Adobe Type Manager (ATM) called ATM GX that is used for smooth display of fonts on-screen and for output. QuickDraw GX adds Apple's updated version of **ColorSync** (version 2.0), which is aimed at giving users a color matching system for achieving more predictable results when working in color. QuickDraw GX also opens the door for high-end typography with features such as use of ligatures, precise letter kerning, and a host of advanced typography features accessed by using specially designed GX enhanced fonts.

- The **MacTCP and TCP/IP** system extensions (which were sold separately) with System 7.5 for use with the **Internet**.

- An enhanced version of the **General Controls Control Panel** that enables you to protect the **System Folder** from being accessed or renamed. You can also protect your applications folders. This is particular useful if children are using the machine.

- Version 8.0 of the **LaserWriter Driver** (besides the GX version of the LaserWriter Extension), which offers enhanced printing and a new print spooling extension.

- The **PC Exchange** extension, which enables you to read, write, and format PC disks.

- An updated **Monitors Control Panel** so you can change monitor resolutions on-the-fly without having to restart your machine.

- **PowerTalk**, an electronic mail and messaging feature for use over networks.

Other enhancements in System 7.5 include faster copying of files, faster switching between applications, and faster displaying of menus. The current iteration of System 7.5 is 7.5.3.

Scheduled for release early 1997, **System 8** (code-named Copland, after the famous composer Aaron Copland) is Apple's next major rewrite of its **system software**. It will be the first complete overhaul since **System 7** was introduced. Apple has noted that Copland will be aimed at addressing two major areas: user efficiency and raw speed.

Although the features that will appear in the shipping version of System 8.0 are subject to change by Apple at any time, some of the features slated for Copland are as follows:

- A major cosmetic facelift for the Macintosh interface will be included along with ability for different users to have different interfaces. You will also be able to have one interface for children, another interface for novices, and a separate interface for more advanced users, all on the same machine. Copland will also add themed interface looks that

can be selected to suit a particular users tastes for their working environment.

The standard interface update reportedly includes new 3D files and folders, a redesigned desktop, more built-in user control of the look of the interface, new menus, and a new typeface to replace the current system fonts of Geneva, Chicago, and Monaco.

- Reportedly 95 percent of Copland's code is to be PowerPC **native** code, which will mean dramatic increases in the speed of PowerPC-based computers.

- Apple is incorporating limited forms of protected memory to enable better overall system reliability by protecting the memory one application uses so it doesn't interfere with another open application. Copland is also going to be Apple's first step into pre-emptive **multitasking** , in which you have different applications sharing different operations more efficiently than they currently can. These long-awaited features are limited versions of what will reportedly appear in **System 9** (Code-named Gershwin, also named after a famous composer, George Gershwin).

- Much of Copland is being written as a series of modules, which enables Copland to run on nearly any Macintosh, including Macs with only 8MB of **RAM** . However, as more RAM is added, Copland's overall performance will increase.

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- A number of system **extensions**, such as **QuickDraw GX**, **QuickDraw 3D**, **PlainTalk**, **QuickTime Conferencing**, and **QuickTime VR** will be built into Copland.

- Copland will add the capability to automate routine tasks for users.

- Copland will have improved and enhanced **windows**, **open/save dialog boxes**, and desktop management features that will enable even greater ease in managing your files.

- **OpenDoc** technology will be included in Copland, which enables software developers to create components or modules that will add functionality to applications. If, for example, you have a word processor and wish it could create Postscript graphics, you could install a module that would add this feature to your Word Processor. This will enable you to customize applications to have only the features you actually need, enabling two users to use the same application but with different features.

- Copland will have updated **networking** capabilities enabling it to plug-and-play into most existing networks, which offers significantly greater ease in setting up and administering networks.

See Apple's Web page for more information on upcoming releases:

http://www.apple.com.

*For More…*

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*If you want to do this...*

> *Go to this entry...*

**Determine what is wrong with your System software Macintosh**

> OS Troubleshooting
>
> Repairing

**Learn more about System 7.5**

> System 7.5

**Learn more about the available Mac models**

> Macintosh Computer Family

**Learn how to rebuild your desktop**

> Rebuilding the Desktop

**Learn some helpful tips and tricks**

> OS Tips and Tricks

**Learn some System shortcuts**

> F-Keys

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*Bibliography*

For more information, refer to:

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*MacWorld Complete Mac Handbook,* by Jim Heid, published by IDG Books, 1996 (1-56884-484-0).

*The Big Mac Book,* by Neil Salkind, published by Que Corporation, 1994 (0-88022-648-X).

*The Macintosh Bible,* by DiNucci et al., published by Peachpit Press, 1995 (1-56609-140-3).

*MacWorld Secrets,* by David Pogue and Joe Schorr, published by IDG Books, 1995 (1-56884-175-2).

# Macintosh OS Troubleshooting

The following table can help you determine your problem more easily so you can plot a course of action to fix your Mac. See Also the sections **repairing** and **troubleshooting** for more information.

**OS Symptoms and Causes**

OS Problem - Possible Cause / Action

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Files are losing their custom icons and reverting to generic items

Invisible Desktop files have become corrupted / Rebuild the Desktop by holding the Option-⌘ keys during restart.

Screen is frozen and mouse won't move

System has crashed / Most likely it has run out of memory. Restart the system. Generally this problem is temporary and a restart will reset the memory and enable you to continue to work.

Can't empty an item in the Trash

File is locked / Hold the Option key and choose Empty Trash or select the locked file, choose Get Info (⌘-I), and uncheck the "locked" option and close the Get Info window. Then choose Empty trash again.

Having repeated system freezes or crashes

Application may not have enough memory, or there may be an extension conflict / If the problem occurs while using one particular program, allocate more memory to that program by selecting its icon and choosing Get Info (⌘-I). Then set the preferred size to a higher figure. You can also try turning on Virtual Memory (to use hard disk space as additional RAM) or using a third-party commercial product such as RAM Doubler from Connectix. If the problems persist, it may be an extension conflict that is causing the crashes. And lastly, it could

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be a corrupted system, which would require a re-install.

You get an error message stating, application is busy, missing, or not found.

You may not have the application that created the document you're trying to open, or the file is not designed to be opened (such as your Finder file or a preferences file) / Launch the application first, then use the Open command to select the document and open it. If the application is not on your disk, you may have to install it to open the document. If the link has been broken from the document to the application that created it, it could also be a sign of a corrupted desktop. You can Rebuild the Desktop by holding the Option-⌘ keys during restart.

Application has unexpectedly quit

Your Mac has run out of available memory, and when the application when looking for more, it found none and quit / Restart your Macintosh. It should be alright now. If it happens again, you may need to use **Virtual Memory** (to use hard disk space as additional **RAM**) accessed through the Memory Control Panel.

Mac crashes during startup

Probably an extension conflict. Could be a corrupted System, which requires a reinstall / Restart the Mac while holding down the Shift key. If it restarts, you probably do have an extension conflict. (See

Troubleshooting on how to resolve an extension conflict.)

Alert box stating, An error of Type 1 occurred

An undefined error has occurred which forced the application to quit, possibly caused by an extension conflict or memory problem / Restart the computer and chances are you'll be OK. If this continues, it may be an extension conflict, which requires troubleshoot.

Can't copy files onto a disk. Says "Disk is locked"

Disk is locked using the manual lock on the disk / Unlock the disk by ejecting it, turning it upside down, and moving the locking tab found in the lower right-hand corner to the unlocked position (the small opening in the tab is covered when unlocked.)

Upon restart or startup, you get a Sad Mac icon with four musical notes

There is some sort of hardware problem. If you just installed RAM, it's probably not seated firmly in its socket / First try restarting the computer. Most times this will go away. If not, and you just installed more RAM, reopen the computer, remove the RAM, and then reinstall it, making sure it's firmly seated. Then close the unit and restart. If it still doesn't work, while the Mac's turned off, recheck all the SCSI cables connected to your Mac. If it's not improperly seated RAM, or a loose SCSI cable, you may have to refer your problem to an authorized Apple service technician.

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Printer could not be found message

> You have not selected which printer to print from in the Chooser / Choose the Chooser from the Apple men, and click the type of printer you want to use. If it's a laser printer, the laser printer's name should appear in the window on the right after you choose the LaserWriter driver. Click it and close the Chooser to make your selection complete. If this doesn't work, make sure all printer cables are snugly connected on both ends and the printer is turned on and warmed up.

You get a blinking question mark at startup

> The Mac can't find a System Folder to startup from, possibly indicated that your system has somehow become corrupted / Try restarting the Mac, that often works. If not, insert your Disk Tools disk (from your system software disks) or your system CD-ROM disc. Your Mac can startup from either of these disks. When it starts up, if you see your hard disk appear on the desktop, you should probably do a clean reinstall which will put a new copy of the System Folder on the disk. (See **troubleshooting** or **clean install** for more information). If after installing a new system it still won't startup, unplug any attached SCSI cables; this could be the problem.

***See Also***
Clean Install; Repairing; Troubleshooting

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# Macintosh Programmer's Toolbox Assistant

Macintosh Programmers Toolbox Assistant (MPTA) is a complete and up-to-date electronic hypertext version of the function reference portions of the new **Inside Macintosh** series. Each entry in MPTA includes references to the specific volume and page of Inside Macintosh from which it is taken.

The following figure shows the main MPTA window. From this window, you can click any underlined text to link directly to that topic. You also can select text and copy it to the Clipboard or drag it to a clipping file or any **drag-and-drop** capable program. Text typed into the Keyword field is treated as a search string. The database searches for possible matches as you type and completes your search string with the first match it finds. In the following figure, for example, the first match found for the search string "mun" is "munger." Like **THINK Reference** , MPTA also supports lookups by other applications. Both **Symantec C++** and **Code Warrior** can look up information in MPTA.

MPTA also supports page annotations. These notes appear as yellow sticky notes directly on the page and can be moved or edited to your heart's content.

Macintosh Programmers Toolbox Assistant uses Altura's QuickView engine for search and display. You can create your own reference databases for QuickView using a special compiler from Altura, and then your own

references can be searched along with the MPTA databases. In fact, Metrowerks now distributes some of the reference material for CodeWarrior in QuickView format.

Apple posts updates and additions to the MPTA databases on the World Wide Web:

> http://dev.info.apple.com/MPTA.html

It's not unusual for new portions of the Toolbox to be documented in MPTA before they make it into Inside Macintosh.

***See Also***
C++; CodeWarrior; Inside Macintosh; Symantec C++; THINK Reference

# Macintosh Programmer's Workshop
***See***
MPW

# Macintosh Project, History
The Macintosh project began with an idea quite different from the Macintosh we all know and love. The project was started in the spring of 1979 by Jef Raskin. Raskin had been asked to head a project to create a low-end $500 game machine. The game machine project didn't interest Raskin, but he did

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have another vision: to create a computer based on how people work rather than on what the technology could deliver. This *human factors* approach was original at the time.

The Macintosh started as a small research project. Raskin envisioned an "appliance" computer to be used by anybody whether they had computer experience or not. This computer would be a closed architecture, with everything built-in, including a screen, keyboard, printer, and disk drive. It would have a fixed amount of memory—64KB—so all programs could run on all Macs. It would be portable and battery powered. The Mac would include a graphical interface that had no visible operating system, but rather a word processor-like workspace where users could edit text, perform calculations, or draw graphics.

Raskin's project to create the "Apple V," as he called it, was strongly opposed by **Steve Jobs** , who was closely involved with the **Lisa** project at the time. Apple's board gave the Macintosh project the go-ahead anyway. At first, the Macintosh project was a small *skunkworks* led by Raskin, with Burrell Smith doing much of the hardware work.

In the meantime, the Lisa project had gotten bogged down with all the changes brought on by the visit to **Xerox PARC** . The Lisa team was tired of Jobs' meddling, and when **Mike Scott** reorganized the company around product lines, Jobs was removed from the Lisa project. More than a little angered, Jobs turned his sights on the Macintosh project.

Once Jobs got involved with the Macintosh, the project grew quickly. Jobs

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saw the Mac as his opportunity to show up the Lisa team by creating a computer that was both cheaper and better than the Lisa.

The Macintosh project gradually took on many of the features of the Lisa, including the 68000 processor, **Bill Atkinson**'s LisaGraf (QuickDraw) graphics core, and the mouse. Raskin was strongly opposed to the mouse, favoring instead a light pen or joystick. Jobs won out, but Raskin did manage to convince the team to at least stick with a one-button mouse.

In February 1982, Raskin had had enough of Jobs and went on a leave of absence that would become permanent. The Macintosh was squarely in the hands of Steve Jobs. It became even more of a crusade under Jobs' chaotic but visionary leadership. The Macintosh team took to flying a pirate flag over its building on the Apple campus. Jobs felt "it's more fun to be a pirate than to join the navy."

The pirates under Jobs' lead were a dedicated—perhaps fanatical—group of programmers, hardware designers, artists, and others. They routinely worked 80 or more hours per week on the Macintosh and loved it. They believed in the Macintosh vision. By the time the Mac was introduced in January 1984, Apple had incurred $78 million in development costs.

A Few of the Macintosh "Pirates"

Bill Atkinson          Wrote QuickDraw and MacPaint

Steve Capps           Co-wrote the Finder

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| | |
|---|---|
| Chris Espinosa | Documentation lead |
| Andy Hertzfeld | Wrote most of the Macintosh Toolbox |
| Bruce Horn | Co-wrote the Finder |
| Susan Kare | Designed the Mac's graphics and fonts |
| Larry Kenyon | Wrote low-level system software |
| Jerry Manock | Managed industrial design |
| Burrell Smith | Designed the digital circuit board (motherboard) |
| Randy Wigginton | Wrote MacWrite |

What an introduction it was! In the months leading up to the Mac's introduction, Apple had carefully leaked just enough information about the new computer to get the industry excited. They used evangelism to get third-party developers to support the Mac. They gave Macs to key "luminaries" in the arts, business, and politics. And there was *the* commercial. Apple's "**1984**" commercial ran during the Super Bowl two days before the product launch. It was a sensation and put the name "Macintosh" in the minds of millions of viewers.

Sales of the original 128KB Macintosh were strong at first, but tapered off quickly. Despite the efforts of Apple's software evangelists, very little software was available for the Macintosh. It was underpowered and

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overpriced, but it was a great start. The Mac limped along for more than a year before things changed for the better.

In 1985, Apple rolled out the Macintosh Office: a vision of Macs networked using AppleTalk and sharing a new printer: the LaserWriter. In part because of the dismal failure of its introductory commercial—"**Lemmings** "— the Macintosh Office was not greeted warmly by Apple's customers. One piece of Office, however, played an important role in saving the Macintosh.

Combined with Aldus PageMaker, which shipped in July 1985, and the more powerful Mac Plus introduced in January 1986, the LaserWriter started the desktop publishing revolution. Desktop publishing gave the Macintosh its "killer application," a use  so compelling that users buy the computer for that use alone. .

Buoyed by desktop publishing, the Macintosh survived and thrived. In 1987, the Macintosh II introduced color and expandability, ending two of the biggest complaints about earlier Macs—color and expandability.

Recently, the Macintosh was born again with the introduction of the **Power Macintosh** . Apple managed to perform a smooth transition to an entirely different microprocessor with little effect on the end user—except for enjoying a speedier computer.

*See Also*
Atkinson, Bill; Evangelism; Jobs, Steve; Lemmings; Lisa; Raskin, Jef; Scott, Mike; Xerox PARC.

# Macintosh Software Archive

The Macintosh Software Archive is a site on the **Internet** that offers a large variety of Macintosh files, freeware, and other documents archived for users who can freely download them via **anonymous FTP**.

**FTP** enables you to connect to a remote computer and transfer files back and forth. More data is transferred via FTP than by any other protocol on the Internet.

Millions of software files are available via FTP on sites around the world, but several sites with gigabytes of disk space are particularly well known as good sources of Mac programs.

Two of the main software archives for the Mac are

- The Info-Mac archives at Stanford University

  ftp://sumex-aim.stanford.edu/info-mac/

- The WUArchive at Washington University at St. Louis

  ftp://wuarchive.wustl.edu/

An estimated 20 to 50 new software titles appear on these archives every week. Because of heavy traffic, these and other software archives have a number of **mirror sites** around the world.

**Anarchie** , an FTP and **Archie** client program for the Mac, provides an easy

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way of searching the software archives. You simply enter a word contained in the file or directory name you are seeking, and Anarchie searches the Archie database of FTP sites for matches. You then receive a listing of filenames and address information so you can retrieve the data via FTP.

The following figure shows the results of a search for the keyword "penguin" using Anarchie to search the Archie database. The files are held in sites around the world, including the two mentioned previously, and others in Finland, Canada, and Australia.

Many of the files stored on the archives have been **compressed** or **encoded** so they can be transported across the network. Such files will have the **filename extension** such as ".hqx," ".sit," or ".cpt." They have to be opened with an application like **StuffIt Expander** or **BinHex.**

***See Also***
Anarchie; Anonymous FTP; Archie; Compressing Files; Decoding Files; Encoding Files; Filename Extension; FTP; Internet; Mirror Site

# Macintosh XL

***See***
Lisa

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## MacLink Plus

MacLink Plus is a DOS to Macintosh translation utility from Dataviz (55 Corporate Drive, Trumbull, CT 06611, Phone: (800) 733-0030. On the Web at http://www.dataviz.com) that enables you to convert most DOS files to a Macintosh file that can be opened and used on a Macintosh. MacLink Plus's specialty is converting those hard-to-translate files from applications that do not have a Macintosh counterpart or for other hard to translate items such as spreadsheets, databases, and graphics files.

MacLinkPlus also excels at holding document formatting (such as bold and italic for text files) as well as advanced formatting (such as tables, charts, and graphs).

*See Also*
Apple File Exchange; DOS/Windows Translation Utilities; PC Exchange

## MacMag Virus

MacMag, also known as Peace, Drew, Brandow, and Aldus, infected only System files until March 2, 1988. On this date it displayed a message of peace on the screen and then deleted itself, making this virus virtually extinct.

*See Also*
ANTI Virus; CDEF Virus; CODE 1 Virus; CODE 352 Virus; Frankie Virus; INIT 17 Virus; INIT 1984 Virus; INIT 29 Virus; INIT 9403 Virus; INIT-M Virus; MacMag

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Virus; MBDF Virus; MDEF Virus; nVIR Virus; Scores Virus; T4 Virus; WDEF Virus; ZUC Virus

# Macmillan Computer Publishing Web Site

A good source for general information about the **Internet** and **World Wide Web** as well as a variety reference materials available online.

Macmillan Computer Publishing's **Web site** contains excerpts and other information about the many computer books published by its branches (including Hayden Books, publisher of *Maclopedia).*

Visitors to the site at http://www.mcp.com/ can also find useful reference guides to the Internet, including:

- The complete text of *Internet Starter Kit for Macintosh.*

- A searchable index to *New Riders' Official World Wide Web yellow Pages.*

- Several **HTML** tutorials.

- A searchable index to J.K. Lasser's *Your Income Tax 1996.*

- Hundreds of shareware, freeware, and demo programs available for downloading from the Software Library (also available from

Macmillan's **FTP** site (ftp.mcp.com).

- BBS forums on running a **Web site** and other topics;
- An **email** newsletter with contests and updates about the Macmillan Web site itself.

***See Also***
Email; FTP; HTML; Internet; Web Site; World Wide Web

# MacMod Pro

An application for editing and playing **MOD** files (a music file format similar to **MIDI** and originally developed on the Amiga). Editing effects include backwards, cross-fade, and echo. A demo version is available from online services.

***See Also***
MIDI; MOD; Sound Trecker

# MacNosy

***See***
The Debugger

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## MacOS Version

## MacPaint

When the Mac first came out in the mid-'80s, it shipped with MacPaint and MacWrite. The former, while it was pretty impressive at the time, has long since been abandoned by Claris, its developer. The MacPaint format for **bitmapped graphics** is still supported by many **paint** and **draw programs**, though, because there's still a lot of artwork (including **clip art**) around in that format. MacPaint files are black and white, and they're all 7 1/2 by 10 1/2 inches, regardless of the elements they contain.

Its main, and perhaps only, strength is its capability to allow for area pattern fills. Pattern fills can be used to paint with or as fills for type.

You can also edit any pattern in the MacPaint library, using the default patterns as a basis. This is done through the pattern dialog box. MacPaint has no capability to allow you to save the new edited pattern, unless you grab the screen and save it as a whole. MacPaint files have to be translated to bitmap format before being suitable for import into Photoshop. Once imported, they can be translated to grayscale, and from there to standard RBG. As an RGB file, color, gradients, and image effects can be applied, using MacPaint

images as a basis for further creation.

***See Also***
Bitmapped Graphics; Clip Art; Draw Programs; Paint Programs

# MacPerl
***See***
Perl

# MacPPP

Popular software by Larry Blunk of Merit Network that provides a Point to Point Protocol (PPP) connection to the **Internet** through a dial-up **modem**.

To install MacPPP, place a control panel Config PPP in your Control Panels folder, and an extension called PPP in your Extensions folder. Then restart your Mac. Make sure that PPP is selected in the main **MacTCP** window. Also make sure you use Server addressing as opposed to Manually addressing with a permanent IP address.

Open the Config PPP control panel. Config PPP is easy to set up.

The "Idle Timeout" feature in Config PPP enables you to specify a time from five to 120 minutes after which MacPPP will close the connection. If you do anything during this time, the timer resets and MacPPP starts counting

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again. The "Echo Interval" pop-up menu gives you the opportunity to configure MacPPP to periodically query the line to see if your connection has dropped. If MacPPP receives no response after three successive requests, MacPPP assumes that the connection has gone dead.

The "Terminal Window" check box brings up a built-in terminal emulator for use when you have trouble logging on, rather than having to use an external terminal emulator.

After you launch MacPPP, click the "New" button to create and name a new configuration. Click the "Config" button to bring up the "Configure Server" dialog box. This is where you set modem variables such as speed, flow control (sometimes called handshaking), tone/pulse dial, and the phone number to dial. The "Modem connect timeout" field gives you a chance to increase the amount of time MacPPP will wait for the connection to occur.

Users have two possible ways of entering their user ID and password: either a MacPPP Authentication dialog (which is not supported by all servers) or a connect script.

MacPPP has a Connect Script dialog window in which you replicate the process of logging into your host. You do this by entering the various carriage returns, ID names, and passwords you usually enter after you are connected. The Connect Script dialog provides eight data entry fields into which you enter each of these commands. By creating a connect script, MacPPP logs in for you automatically, eliminating the need to type passwords and other commands each time.

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After MacPPP is configured, simply click the Open button in Config PPP or open a MacTCP-based program that opens MacTCP, which causes MacPPP to connect automatically. To close your connection, first quit all MacTCP-based applications. Then click either the Hard Close button to hang up the connection and "locks" MacPPP, or the Soft Close button to close the connection but leaves open the auto-connect feature so launching a new application makes MacPPP establish a new connection.

***See Also***
Asynchronous Data Transfers, Internet, InterSLIP, Modem, Network, Packets, Parity, PPP, SLIP

# MacRecorder

MacRecorder is a sound digitizer for the Macintosh that captures 8-bit mono sound at up to 22KHz **sampling** rate. It is also possible to digitize in stereo using two MacRecorders. Manufactured by Farallon but later sold to **Macromedia**, the MacRecorder came bundled with the application **SoundEdit**, and when it was released in the mid-80's, was the cheapest and easiest way to digitize sound on the Macintosh. The MacRecorder was attached to either the serial or printer port, and SoundEdit recorded and then edited the sound. Later, Macromedia released a system Extension, the MacRecorder Driver, that provided operating system access to the MacRecorder. This enabled you, for example, to record System beep sounds directly in the **Sound Control Panel** using the MacRecorder, or use the MacRecorder with

other software that worked with the Macintosh internal digitizing hardware that had become available on most Macs. For example, the audio XCMD for HyperCard could use the MacRecorder only if the system Extension was installed.

The small MacRecorder box contained a microphone, a line-in plug, and a volume control for adjusting the sensitivity of the microphone.

Now that all Macintosh computers come with built-in sound digitizing capabilities (even if they don't always come with a microphone!), the MacRecorder is of little use. SoundEdit, however, has been updated and is still being sold.

***See Also***
DECK II; SoundEdit

## MacRenderMan

A Macintosh application that supports RenderMan, MacRenderMan is a **rendering** language developed by **Pixar**. RenderMan is a language, as well as the name of products sold by Pixar that support that language.

While capable of generating high-quality renderings, MacRenderMan is a surprisingly difficult product to use. It acts like a **print driver**, requiring that you select and control the renderer using the **Chooser**, which makes it difficult to set up and run. And at the time it was released it did not run well

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in 8 megabytes, the most common memory size.

RenderMan is a rendering language much like **PostScript** is a page description language. The scenes and models must first be written to the RenderMan file format **RIB** (RenderMan Interface Bytestream). These files are then turned into photographic quality images by the MacRenderMan renderer. Users can also write their own custom **shaders** . But because RenderMan is a complicated language to learn, and because few third-party applications were adapted to use RenderMan, few users were able to make use of the full power of the product.

Pixar released two end-user products, **Typestry** and **ShowPlace** , but these are fairly limited tools. Certainly, neither application could be used to create the kind of animation that Pixar creates for its clients and movies. It's surprising that a company as well known for animation and rendering quality never released a powerful animation tool. Pixar no longer officially supports any of its Macintosh products.

Some third-party 3D tools, including Silicon Beach's Super 3D and Macromedia's Macromind Three-D did support MacRenderMan as an optional renderer. As an option, they had their own rendering engine, but also supported MacRenderMan.

***See Also***
Pixar; Rendering; ShowPlace; Typestry

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## Macro

A macro is any set of functions, **keystrokes** , or movements of the **mouse** that are recorded and assigned to one key or keystroke combination for instant playback.

You can, for example, create a Macro that **launches** America Online, signs on using your name and password, checks your **email** , **saves** all incoming email to your **hard disk** , signs back off and quits the program, with one keystroke—a macro. Any boring or repetitive task is a candidate for a macro. You can, for example, create a macro that types in your name and address anytime you type the keystroke **Control** -A. Or you could create a macro that backs up any file created to a back-up disk, all with one keystroke. Macros can be simple one- or two-step tasks, or they can be very complex tasks that take hours to complete.

Macros are created using a macro program (such as QuicKeys and Tempo). To create a macro, you tell the macro program to record your actions, and it will record your keystrokes and mouse movements. When you're done with the task you want recorded, you stop the recording process, and the macro application asks you to which keystroke combination do you want to assign the recorded tasks. Let's say the task you recorded, as an example, was opening every file in a particular **folder** and resaving the files in that folder in a PC-compatible file format, and let's say the keystroke you choose was Control-F. The next time you need to convert a folder full of files from Mac to PC format, you press Control-F and the macro does the task for you,

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exactly as you did before. There are hundreds of uses for macros, and their aim is to automate boring repetitive tasks for you at the press of a key.

AppleScript is Apple's scripting language, for System 7 and higher, that enables you to create macros at the Finder or in any application that is scriptable. This gives applications the built-in capability to automate repetitive tasks without having to use a third-party macro application. There are also applications that are recordable, which enables you to record a series of steps from within the application. (If the application is not recordable, but it is scriptable, you can still use AppleScripts, but you have to create the scripts yourself by typing the script into the ScriptEditor, rather than having the ScriptEditor record your steps as you go. ) If the program is also attachable, you can assign these scripts to menu commands or on-screen buttons for instant access.

You can have AppleScript record your actions, mouse movements, and keyboard strokes, and even save them as mini-applications (called applets). This way, you can put these applets anywhere you want and click an AppleScript icon to have it run its script. After you've created an AppleScript, you can edit these scripts in the ScriptEditor.

An example of an AppleScript might be a script to sign on to an online service, check to see if you have email, download your email into a pre-selected folder, and then log off again. System 7.5 comes with a few Finder sample scripts already written for you, and they're accessed through the Automated Tasks folder on the Apple menu.

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## Macro Language

## MacroMaker

MacroMaker is a macro program developed by Apple that was included with **System 6** . MacroMaker enables users to create **macros** to automate repetitive tasks. When MacroMaker is installed, you turn it on through an **icon** on the **menu bar** that looks like a small cassette tape. When you turn MacroMaker on, it starts recording your keystrokes and mouse movements until you select Off from MacroMaker's **pull-down menu** . You can name these macros and save them to MacroMaker's pull-down menu for easy access.

MacroMaker was discontinued after **System 6** and does not work with **System 7** and higher, although there are a number of full-featured third-party macro programs like **QuicKeys** and **Tempo** available for creating custom Macros.

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Icon; Macros; Menu Bar; Pull-Down Menu; QuicKeys; System 6; System 7; Tempo

# Macromedia Director
***See***
Director

# Macromind Three-D

A general purpose three dimensional animation and rendering package, Macromind Three-D enables you to create basic shapes (balls, rectangles, etc.), or import models. Its primary function, however, is animating and rendering objects. This program resembles, in feature set, the much more expensive, professional tool **Electric Image** . While Macromind Three-D is quite a good tool, its performance, both while creating and previewing animation, as well as during rendering was poor.

Macromedia has discontinued Macromind Three-D and replaced it (and the companion tool **MacroModel** ) with **Extreme 3D** , which offers modeling, animation and rendering features.

***See Also***
Extreme 3D; MacroModel; 3D

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## MacroModel

Released by Macromedia as a companion to their **Macromind Three-D** product, MacroModel offers sophisticated modeling tools and rendering capabilities, but for animation you have to use another product (such as Macromind Three-D). MacroModel offers spline based editing tools for creating models, in many ways resembles Alias's **Sketch!**

MacroModel was available for Windows, as well as the Macintosh platform. It, and Macromind Three-D, have been discontinued and replaced with a single program, Extreme 3D, which offers modeling, animation and rendering features.

***See Also***
Extreme 3D, Macromind Three-D, 3D

## Macro Programs

Macro utility programs such as **QuicKeys** (from CE Software) and **Tempo II** (from Affinity Microsystems) enable you to record keystroke or mouse movements to automate repetitive or time-consuming tasks. After a **macro** program has recorded your movements, you can assign these movements to a keyboard keystroke, or a **function key** , which "plays back" the recorded steps when pressed.

Apple has its own Macro creation program, called **MacroMaker** , that

shipped as a part of **System 6** , but was discontinued with the introduction of **System 7** . Commercial macro programs, such as QuicKeys and Tempo, are powerful, full-featured programs that enable a wide range of customization and the capability to create, and link, complex macros together to perform tasks very time consuming and complex otherwise.

***See Also***
Function Keys; MacroMaker; Macros; QuicKeys; System 6; System 7; Tempo

# MacsBug

MacsBug was the *original* low-level **debugger** for the **68000** family of microprocessors used in the Macintosh. Motorola wrote the first versions of MacsBug before the Mac existed. In fact, the name "MacsBug" doesn't come from Macintosh at all, but rather is an acronym for Motorola Advanced Computing Systems deBUGger.

MacsBug is the low-level debugger of choice for many programmers, largely because it is available for free from Apple. But don't let that fool you into thinking it's a second-rate debugger—far from it. MacsBug is capable of doing most of the low-level chores a low-level debugger is expected to do.

Installing MacsBug is simple: just drop it into the System Folder and restart. The System Folder doesn't have a special subfolder for debuggers. Unlike Extensions and Control Panels, debuggers must be in the System Folder itself. When you restart with MacsBug installed, a special message is displayed in

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the Welcome to Macintosh dialog that lets you know it's up and running.

All properly behaved programs will run normally with MacsBug installed. It's easy to forget it's even there until a program crashes. Then, instead of the usual error dialog letting you know an application has "unexpectedly quit," you are dropped into MacsBug with a short message about the cause of the error.

For programmers accustomed to high-level debuggers, the MacsBug interface can be quite a shock. The following figure shows the MacsBug display that completely takes over your computer's main monitor when the debugger is activated.

The MacsBug screen is divided into four parts. The left side displays the contents of the processor's **register**s, as well as the name of the current application and the first few items on that application's **stack**. Along the bottom is the command line. Any commands you type will appear here. Above the command line, the next few lines of object code are displayed in disassembled form. Finally, the remainder of the screen is a scrolling region that displays the results of any commands that you enter.

Most of MacsBug's commands are beyond the scope of this book. A few of the most commonly used commands are summarized in Table M.1. A great place to start is the help command, which displays a full list of all commands, as well as information on how to use some of MacsBug's more complicated features.

A Few Common MacsBug Commands

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| Command | Function | Comments |
| --- | --- | --- |
| g | go | Continues execution after a user break |
| s [n] | step | Steps execution ahead by n instructions (or 1 if n is omitted) |
| es | exit application | Exit the current application |
| rs | restart | Unmount all disks and reboot |
| how | how | Shows the reason MacsBug was entered |
| il [addr [n]] | disassemble | Displays the disassembly of the next n lines of object code beginning at location addr |
| sc | stack crawl | Displays the chain of subroutine calls leading to the current instruction |
| hd | heap dump | Displays the contents of the current application's heap |
| help | help | Displays help text |

A few of these commands can be useful for non-programmers as well. The most generally helpful command is *es*, which enables you to exit the current application. Using es after a crash can frequently give you the chance to save any open documents in other applications before you restart.

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Despite its 68000 origins, recent versions of MacsBug handle **PowerPC** debugging with aplomb. Many commands have been transparently extended to work properly for both 68K code and native PowerPC code. Other commands have been supplemented with PowerPC versions that act the same as their 68K counterparts.

MacsBug is freely available for Apple's World Wide Web and FTP sites:

>   http://www.apple.com/ or ftp://ftp.info.apple.com/

as well as their forums on CompuServe, eWorld, and America Online.

***See Also***
68000; Debugger; Heap; Register; Stack

# MacTCP

Software that enables a Macintosh to communicate with other machines via **TCP/IP** (Transmission Control Protocol/Internet Protocol), a packet-based communication protocol that forms the foundation of the **Internet** .

MacTCP, along with either a direct network connection or **SLIP** or **PPP** software, enables a Macintosh to function as a machine on the Internet that can send and receive **email** , download or transmit software, or even function as a **server** for **FTP, Gopher,** or **World Wide Web** documents.

In fact, because the Internet is based on TCP/IP protocols, MacTCP is the only

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way for a Macintosh to have a full Internet connection.

MacTCP comes bundled with System 7.5 software. A version of MacTCP is also included on the disk that accompanies **Internet Starter Kit.**

Although MacTCP enables communication between Mac and Internet, the way a user configures MacTCP differs depending on the protocol used to connect the user's Mac to the Internet—SLIP, PPP, or **direct network connection**.

Another important piece of information to know before configuring MacTCP is whether your **Internet service provider** has assigned you an account that is:

- Manually addressed with a "static" **IP address** .
- Server-addressed with a "dynamic" IP address that is assigned differently each time you connect to the server.
- Dynamically, at random (which is dangerous and seldom-used).

For instance, in the MacTCP configuration dialog shown in the following figure, you choose one of the buttons in the top left section to specify whether you have a Manual, Server, or Dynamically assigned IP address. In the bottom right section, you type your Internet provider's domain name and its IP address(es).

You will have to get the **domain name** and IP address information from your Internet service provider (see the entry for **SLIP** for a set of questions

to ask your provider). Although you do not need them to configure MacTCP, you should at some point also get from your provider the addresses of your SMTP (Simple Mail Transport Protocol, used with email) and NNTP (Net News Transfer Protocol, used with Usenet) servers as well as your Post Office Protocol account (POP, used with email).

The following table lists examples of this account information.

MacTCP Account Information

| *Item* | *Example* |
|---|---|
| Connection method | SLIP, LocalTalk, Ethernet |
| Addressing style | Manually, Server, Dynamically |
| IP address (if manually) | 192.135.191.128 |
| Gateway address (if necessary | 192.135.191.253 |
| Network class (if manually and necessary) | A, B, or C |
| Subnet Mask (If manually and necessary) | Ask |
| Primary and Secondary Name Servers | 198.137.231.1 |
| Local domain | uchicago.edu |
| SMTP mail server | midway.uchicago.edu |
| NNTP news server | uchinews.uchicago.edu |

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| | |
|---|---|
| POP account | g-holden1@midway.uchicago.edu |
| Email address | gholden@midway.uchicago.edu |

To start working with MacTCP, copy the MacTCP control panel into the Control Panels folder in your System Folder. If you drag the program onto the closed System Folder, System 7 will move it to the right location. Also drag the Hosts file to the System Folder.

If you are upgrading from a previous version of MacTCP, open the current MacTCP Control Panel and write down all of the settings. Then delete the old MacTCP control panel and the MacTCP DNR file from the System Folder, as well as the MacTCP Prep file which is in the Preferences folder.

If you plan to connect to the Internet via PPP or SLIP, first install software such as InterSLIP or MacPPP (see the entries on **InterSLIP** and **MacPPP** for specific configuration instructions).

Restart your computer and choose the MacTCP control panel to bring up the MacTCP main window.

You must select one of the icons (you may have more, or fewer ones) in the upper part of the control panel to tell MacTCP how you plan to connect. if you have a LocalTalk network attached to the Internet through a router, select the LocalTalk icon. If you are on an Ethernet network, select the Ethernet icon. If you have SLIP, select the InterSLIP icon. You can set your IP address

in the lower part of this window, but only if you have a manually addressed account. If you have a server-addressed account, set this box to 0.0.0.0.

Clicking the "More" button brings up the configuration dialog illustrated earlier in this entry. See previous sections for instructions on how to fill out this dialog box.

***See Also***
DNS, Internet, Internet Service Provider, InterSLIP, MacPPP, Network, Router, Server, SLIP, PPP

# MacTools Pro

MacTools Pro, a commercial product from Symantec, (10201 Torre Ave, Cupertino, CA, 95104-2132, Phone (800) 441-7234 Retail price: $99. Web site at http:// www.symantec.com) is a popular suite of diagnostic/repair, data protection, data recovery, and system enhancement modules that add a host of features to your Mac's system. They include:

- Disk Fix, a full-featured repair utility similar to Norton Disk Doctor that offers a comprehensive diagnosis and repair program with complete reporting. Disk Fix also features the capability to undo a repair, if undesired results are experienced. This utility also includes AutoCheck and AutoRepair, which work in the background and during idle time to diagnose and repair problems before they become serious.

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- Disk Light, a menu bar disk status indicator that blinks anytime a mounted disk is being accessed.

- TrashBack, designed to help you retrieve files that you deleted by emptying the Trash. This utility also protects files from being overwritten (which would permanently erase the file). On the other side of things, TrashBack can also wipe out files completely, leaving nary a track (to conform with Department of Defense standards), providing a layer of protection for the user by eliminating the ability of an outside individual to restore personal files from your disk that have deleted.

- Undelete, designed as a recovery utility used as an alternative when TrashBack when has not been installed.

- RAMboot, designed to build a startup disk in memory for rebooting, eliminating the need for an emergency disk and enabling you to diagnose and repair damaged disks, even on the System Startup disk, with no rebooting at all.

- SmartTips, designed to help users identify and troubleshoot hardware and other system problems and guides users, step-by-step, through repair procedures.

- Optimizer, a utility used to defragment your hard disk.

- Anti-Virus provides idle time scanning of your hard disk for computer viruses.

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# MacWeb

A simple **browser** or **client** program for navigating the **World Wide Web**. Requires less memory than many other browsers, thus making it useable on a wider range of computers.

As this was being written, TradeWave was preparing to take MacWeb from shareware to commercial status. The commercial release was expected to support background images, inline **JPEG** images, many **HTML** extensions.

The present version downloads text before graphics, stores Web pages in **cache** to speed up reloading or revisiting a page; has **bookmarks** and hotlists, and enables users to "turn off" image display to make **SLIP** or **PPP** connections easier and faster.

One innovative feature of MacWeb is a shortcut for navigating to sites you have already visited in the current session. Simply click and hold either the Forward or Back buttons. After a second or two, a pop-up menu appears, listing the history.

To choose Open **URL** to type or paste in a new URL, MacWeb provides a pop-up menu of your hotlist items. You can select an item from the list, which pastes its URL into the URL field.

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Home page: http://www.einet.net/EINet/MacWeb/MacWebHome.html/.

***See Also***
Bookmarks, Client, NCSA Mosaic, Netscape Navigator, PPP, SLIP, URL, Web Browser, World Wide Web

# MacWorks
***See***
Lisa

# MacWorld Expo

MacWorld Expo is a huge Macintosh-centric computer expo held several times each year. The two largest expos are in San Francisco each January and in Boston each August. Other MacWorld expos are held in Japan and Germany.

For many Macintosh aficionados, MacWorld is a required event. The expo consists of three primary parts: exhibits, or the show floor; conferences; and parties. Taken in the appropriate proportions, these make MacWorld a great time.

The exhibits are much like any trade show and include booths for virtually every major Macintosh software and hardware company. The exhibitors show their latest offerings and present demonstrations of their products. The

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demos are often punctuated by a door prize or two given to those patient enough to sit through the demo. Many people attend MacWorld just for these giveaways and for the excellent sale prices often offered at the show.

The conferences offer seminars on a wide variety of Mac-related topics, from education to desktop publishing to programming. Although attending the conferences adds significantly to the price, many of the sessions are excellent. The presenters are frequently the top in their field, and the keynote address is generally given by a major figure in the Macintosh world.

Last, but certainly not least, are the parties. For some, MacWorld is just a week of parties. Various hardware and software companies throw parties (or hold more sedate events, such as breakfast) for their important—and sometimes not so important—customers. These events can be quite elaborate. It's not unusual, for example, for a company to rent out Boston's Computer Museum or other similar venue to hold their MacWorld event.

Whether you go for the parties, the great information, or the free stuff, MacWorld Expo is an event not to be missed.

***See Also***
History & Culture

# MacWrite Pro

When the Mac first appeared on this author's desk, back in 1984, it had two

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programs installed. One was MacPaint, which set the standards for computer graphics. The other was MacWrite, which was just as revolutionary, in its own way. It was the first word processor that could use different **fonts.** It was also the first one that could place a graphic in a page of text. Most important, it introduced point and click word processing. Apple's MacWrite became Claris MacWrite, through some internal reorganization at Apple HQ, and kept pace with the other word processors, without raising its price through the roof, and without becoming so feature-laden that it needed a huge hard drive and outrageous amounts of RAM to make it run.

The current version, MacWritePro, has text-handling capabilities that go far beyond word processing to real desktop publishing. Like the big guys, WordPerfect and MS Word 6, it can create a Table of Contents in a long document or insert a QuickTime movie into a document. It has very convenient text, style and tool palettes, and a function very similar to System 7.5's Stickies that enables you to place notes on your documents. If your Mac has a microphone, you also can record voice messages on your notes. MacWritePro can edit linked objects created in MathType, microExpressionist, and other programs that support EGO (Edit Graphic Object). It can create and send email via PowerTalk, and it is optimized for Power Macintosh use.

One of the best uses for MacWritePro is as a simple DTP program. It comes with a folder full of examples that includes newsletter and annual report samples, as well as fax covers, memos, and other useful business and personal documents. Each of these illustrates some of the possibilities for layout and design with MacWritePro.

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This program, like many of the high end DTP programs, uses frames to hold pictures, text, tables, and notes. The preceding figure shows a page view of a newsletter, including a note frame, text frames, and graphics frames. Frames give you a great deal of flexibility in laying out pages. Text frames allow you to place a headline or a sidebar without wading through endless dialog boxes, or creating new styles. Using the graphics frame enables you to crop the graphic to fit the page. You can resize the frame by clicking and dragging it. You can also use the frame to anchor a graphic to its text. An anchored graphic is the same as an inline graphic. An invisible marker is placed in the text where the graphic should be. If you change the formatting of the text or the amount of text so that the anchor jumps to another column or page, the graphic goes with it. There are even movie frames, which display QuickTime movies. (Because QuickTime files are very large, MacWritePro saves one frame of the movie and links to its disk location.)

Of course, it also can handle ordinary writing chores. The floating palettes make formatting text a cinch. You can always see the available styles, unlike most programs that make you open and scroll down a list. Creating and editing styles is managed from the same palette. It handles mail merges quite well, with a built in dictionary and thesaurus. It doesn't check grammar, but considering how badly other word processors do so, that's no loss. If it has a serious fault, it's that there's only one level of Undo. You can't retrace your steps if you've done something seriously stupid. But with a word processor this easy to use, you're unlikely to make stupid mistakes.

***See Also***

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Nisus Writer; WordPerfect; Word Processors; Write Now 4

## Mad Dog McCree

**See**
First-Person Perspective Shooters

## Maelstrom

**See**
Crystal Crazy

## Magazines, Mac Gaming

Just about every magazine that covers computer covers games, but Mac game coverage can be a little sparse. At this point, the best bet is the CD-ROM magazine *Inside Mac Games* (IMG). IMG offers the widest range of games and interactive entertainment coverage of any publication and comes chock full of demos and previews, as well as shareware games to download. *Inside Mac Games* is published 10 times a year and based in Canada.

On the paper publication side, *MacHome Journal* offers monthly coverage of Mac-specific games in its recently upgraded interactive entertainment section and offers up to 10 game reviews each month. PC Entertainment is a

dual platform book, covering mainly the slew of PC titles before they port to the Mac, but they do a great job of keeping up with Mac games and making sure you know when a port is going to occur if the title hits the PC first. Other magazines including *ComputerLife*, *Wired*, *MacWeek*, *MacWorld*, and the online publications *MacSense* and *XYZZY News* cover Mac games more sporadicly.

The best way to gauge when to pick these up is to wait for an entertainment themed issue. As time goes by and more cool games pop up for the Macintosh and more platform merging titles like **Hexen** and Havoc are released, no doubt monthly coverage will step up accordingly.

# Magic Cookie

A feature of the **World Wide Web** browser **Netscape Navigator** that stores information about a user's relationship to certain **Internet** sites. Also called *HTTP Cookie.*

The "Magic Cookie" is a file that resides in your Netscape Preferences folder. You can open it with Netscape by dragging its icon onto the Netscape icon or with SimpleText. Its exact appearance varies, depending on what sites you've visited.

A "cookie," in this case, is a short database entry about you that a Netscape-savvy server has asked Netscape to store on your hard drive. It contains things like the name of the server's site, the parts of the server's site

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wherein the cookie is recognized, your user ID on the site, an expiration date for the cookie, and simple yes/no instructions on whether the cookie must be transmitted securely. (The notion that servers are maintaining a file about you obviously raises some questions about invasion-of-privacy issues.)

When you return to a site listed in the Magic Cookie file, Netscape transmits the information in the cookie to the site's server, who will know who you are. Alternatively, the server can request a cookie.

**Web sites** with "Shopping bag" services can make use of cookies by linking your purchase (stored on the server) with your identity (stored on your computer). There are other ways to implement shopping bag-like features without the use of cookies that many other sites use.

***See Also***
Electronic Commerce; Encryption; Internet; Netscape Navigator; Secure HTTP; Secure Sockets Layer; World Wide Web

# Magnetic Tape

***See***
Online Storage

# Magneto Optical (MO) Drives

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Magneto optical drives offer the largest amount of data storage; however, that have considerably slower access times compared to hard drives and most other removable media drives. Magneto optical drives enable you to write and rewrite data to a CD-type media cartridge. These drives use 3.5 inch and 5.25 inch removable media, usually a CD-size disk in a permanent casing. The external casing is very similar to that of a floppy disk. They can store 120MB to more than 1GB of data on one disk.

One pitfall to using magneto optical drives is that the software drivers vary from drive maker to drive maker. If you plan to share magnet optical information across different brand devices, make sure that differing drives can read each other's formatted CDs. Also, keep in mind that the magneto optical cartridges range in price form $20-40 each.

## Mailbox Extension

This extension is installed if you have PowerTalk on your system. It enables support for individual mailboxes.

***See Also***
PowerTalk

## Mailing List

A mailing list is a means of conducting **email** discussions on the **Internet**

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between groups of people with similar interests.

A mailing list is made up of subscribers who receive and read email messages sent by other list members. Every email message sent to the list is distributed to all of its members, any of whom can send email replies that can develop into text-based discussions.

Mailing lists are similar to **Usenet** newsgroups in that they consist of messages and replies posted to everyone in the group. The difference is that mailing list communication occurs via email. Email is more immediate than newsgroup postings that have to be collected by a news server, and mailing list subscribers do not need special client software (other than their existing email software) to read and send messages.

Mailing list discussions tend to be more focused than newsgroup postings because the number of subscribers is much smaller. Some mailing lists are used for announcements of new software or newsletters on specific topics rather than discussions.

Two kinds of mailing lists occur on the Internet:

1.   Moderated lists maintained by an individual who monitors discussions and adds and subtracts subscribers to and from the list.

2.   Unmoderated lists maintained by an automated server, sometimes called a **LISTSERV** .

Mailing lists can be hard to locate, but there are a few sites on the Internet

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that present lists of the various lists. Do a search on one of the Internet search engines, or try the DTP Internet Jumplist:

http://www.cs.purdue.edu/homes/gwp/dtp/groups.html

After you find a list, subscribing is easy.You either find the email address of the person who "owns" or runs the list, and send a polite message asking to be subscribed or, in the case of a LISTSERV, send a standard email message such as:

subscribe [*your name*] [*your email address*] [*name of mailing list]*

You will receive an automated reply along with instructions on how to use the list and how to unsubscribe (be sure to keep this initial message in case you ever do want to know how to unsubscribe).

Traffic on mailing lists can be heavy, and it's not uncommon to receive dozens of messages a day. Mailing lists that reach a high level of traffic sometimes create digest versions that contains all the individual messages arranged ina specific way. Subscribers then receive one long message per day instead of many messages throughout the day.

### *See Also*
Electronic Mail; LISTSERV; Netscape; Eudora; Internet; POP3; QuickMail; SMTP; Web Server; WebSTAR; World Wide Web

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## Majestic
*See*
Adventure Games

## Major, Anya
*See*
1984

## Major Software Release

A major release is a major upgrade of the software, containing whole new groups of functionality and features. It also may include significant changes to the user interface. Frequently, it will include new file storage formats that will make files created by the new version inaccessible to users of an older version; fortunately, the new software will (almost without exception) read files created by the older versions. If the version number is two numbers, the second of which is zero separated by a decimal point (for example, 2.0), you have a major release. If the second digit is a 5 (for example, 3.5), you have a release that is probably more significant than a minor release, but that someone objected to classifying as a major release. In addition to being the highest-priced type of software upgrade, major releases will often exact additional costs in processing power enhancement, memory expansion, or

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storage space increases.

***See Also***
Minor Software Release

# Make Alias Command

The Make Alias command is used to create an **alias** of a file. An alias is like a proxy in that it's not really a copy of the file, but rather a pointer back to the original file. It behaves much like the original file.

Here's an example of why you might want an alias and how they work. Many applications have helper files or other documents that they need to launch. These files are kept within that application's folder or in the System Folder so the program knows right where to look for them. If you were to move the application out of its original folder, it might not be able to find those auxiliary files, and might not open correctly. In short, some applications must stay inside their original folders. **Apple** created a way to give instant access to a program without having to dig through layer after layer of folders: aliases. Aliases are great for enabling access to an application in multiple places. You may want an alias of a particular application in the Apple menu, for example, plus an alias of the same application right out on your desktop. If you have a folder for your work that you access often, you may want an alias of the application there as well. Since aliases take up such little memory, you can have as many aliases in as many locations as you wish.

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Making an alias is easy. Just click the program or file you want to have an alias of, and then select Make Alias from the **File menu** (⌘-M).

When you create an alias, a copy of the item's icon is created, the alias filename is italicized, and the word alias is appended to the filename to let you know it's an alias. Because they are not copies of the original file, just a pointer back to it, aliases are very small in size. This enables you to create a alias of any file and put it anywhere on your hard drive or on your **desktop.** When you **double-click** the alias, it launches the real file or program behind the scenes.

You can make aliases of files, documents, programs, folders, even the **trash can** if you want. Many people use aliases to put frequently used programs and folders in their **Apple menu.** That way, without opening their hard drive, a window, or any folders, they can launch an application or file instantly by choosing its alias. If you ever need to find the original file you used to create the alias, click the alias and choose Get Info from the File menu. The Get Info window shows you where the original file is, and the Find Original button locates the file and brings it to you.

Another excellent use of aliases is for documents that you need in two different locations on your drive. Let's say, for example, you and your partner share the same computer, and you have a folder where you keep all your standard business letters. You may also want your partner to have access to these same letters. You can make a copy of all the files and give them to your partner, or instead you can make aliases of the letters, (which

take up much less space) and place the aliases in a separate folder for your partner. That way, your partner can organize the folder to his/her liking, find the business letters fast, and you both can work on the same documents without having to make any copies.

Also, if there's a document you use very often, such as a template for your company letterhead, an alias comes in very hand. For easy access, put an alias of the document in the Apple menu. That way, when you need to dash off a quick letter, all you have to do is select the letterhead template directly from the Apple menu, rather than searching through folders on your drive to find it. Aliases are there for your convenience.

If you're on a network, you can also create an alias for the server to give you instant access. Many users put this alias on the desktop so they're never more than a click away from the server.

To make an alias, follow these steps:

1. Click the item you want to make an alias of.

2. Select Make Alias (⌘-M) from the File menu.

3. An Alias appears next to the original with the name of the alias in italics and the word alias appended to the end of the filename, as shown in the figure.

***See Also***
Alias; Apple Menu; File Menu; Trash

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## Make QTVR Object

An application that converts **QuickTime** movies into **QuickTime VR** object movies. Available from Apple's Web site (http://www.apple.com).

***See Also***
QuickTime VR; QuickTime VR Authoring Tools Suite; Make QTVR Panorama

## Make QTVR Panorama

An application that converts a panoramic image into a **QuickTime VR** object movie. Available from Apple's Web site (http://www.apple.com).

***See Also***
Make QTVR Object; QuickTime VR; QuickTime VR Authoring Tools Suite

## Manager

***See***
Toolbox

## Mancala

***See***
Classic Collection

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## Maniac Mansion

***See***
Full Throttle

# Map Control Panel

This **control panel** enables you to enter the name of a major city from around the world and have the exact latitude, longitude, current time, and distance you are from the city calculated for you. The location of each city entered is highlighted on a world map that appears at the top of the Map Control Panel.

The Map uses the location information entered in your **Date and Time** Control Panel as a starting point to calculate your distance from various points across the globe. You can also ask the Map to show you the distance in miles between any two cities.

To use the Map Control Panel, follow these steps:

1.  Choose Map from the Control Panels submenu on the Apple menu (or System Folder).

2.  Enter the name of a major city and click Find.

3.  Your location (as set by your Date and Time Control Panel) and the city you've entered blink on the map, and the latitude, longitude, and

current time in that city and the distance between the two cities is displayed.

4. To enter a different base city (other than your own), you can enter a city name and press Set. Then enter a second city and the mileage between those two cities is calculated. You can also set a different base city to set the system clock, which is a handy when traveling with a PowerBook.

5. To see a list of the cities in the map, hold the Option key and press Return. If your city is not on the map's list of cities, you can add your city if you know the longitude and latitude of your city. Enter them in the Map Control Panel and click "Add City" to add your city to the map's list.

***See Also***
Control Panel; Date & Time Control Panel

# Map and Atlas Programs

One of the best uses for **CD-ROM** technology is the interactive map or atlas. You'll find many of these in the software catalogs and on dealer shelves. Which one to choose depends on the kind and degree of detailed information you need. A general atlas, such as DK's *Cartopedia* or Brøderbund's *Maps 'N' Facts*, gives you a comprehensive overview of the physical world, along with political boundaries and basic information about each country. Included are

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such details as literacy rates, exports, economic data, health statistics, and even the number of TV and radio stations and newspapers.

For a much closer look, there's DeLorme's **Street Atlas USA** , which is a massive street-level database for the entire USA on one CD-ROM. It enables you to zoom in on virtually every city, town, and rural area in the country, and shows the names of all the streets, as well as state, county, and interstate highways. The database contains more than 12 million street segments and 1.1 million geographic and man-made features, such as mountains, rivers, lakes, and prominent monuments.

Street Atlas USA is very easy to use. You type in the name of a city and state, telephone area code and exchange, or ZIP code to find any area of the country. You can then search for any street within the map you're viewing. In larger metropolitan areas, Street Atlas USA also displays block address ranges. You can even print maps directly from the program. But don't get carried away…. If you printed out all of Street Atlas USA at the highest level of detail, the finished map would cover more than 10 football fields.

*See Also*
Street Atlas USA

# Marathon I & Marathon II: Durandal

**Marathon** , Bungie Software's answer to game players pleas for a Mac version of **Doom** , pits you against hostile aliens who are trying to take over

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the inhabitants of the spaceship Marathon. In addition, the ship's computer has gone awry and is hindering your mission to rid the ship of the unwelcome alien guests.

As in most first person shooters, the interface in Marathon shows you your stamina (how much air you have left in your space suit) as well as other necessities like weapons inventory and a motion detector for tracking aliens. **Marathon II** has twenty-nine levels and picks up seventeen years after the first game. You've been transported to the distant planet L'howan and must rid it of the evil aliens, the Phfor. The Marathon games implement more of a strategy edge than Doom, with complex puzzles and tougher-to-kill foes. Marathon adds multilevel strategies; aliens are not always on the same level platform, lurking above and below, as well as next to you. Both Marathon I & II can be played by multiple players over a **network** , II comes with an extra serial number so you don't have to purchase a second copy.

***See Also***
Descent; Doom II; Hexen: Beyond Heretic; Violence in Games

# MarcoPolo

A document imaging and management system for all kinds of Macintosh documents. The paperless office is a concept whose time is coming closer. Pretty soon, we'll be storing most of our documents on our hard drive, or on removable Syquest cartridges, **CD-ROM** s, or some other high density storage

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mechanism, and we could end up even worse off than we are now, with no idea where to look for anything. It's easier to flip through a file cabinet in search of a missing contract or letter than it is to look through hundreds of megabytes of miscellaneous data.

Mainstay's MarcoPolo has come to our rescue. It stores documents and files in databases called Document centers. These contain electronic documents from all kinds of applications, compressed and tagged with keywords to help you locate the ones you need to retrieve. Related documents can be grouped together, regardless of the application that created them. Documents are displayed on the computer screen by MarcoPolo, not by their creator application. If you're looking for a particular piece of data in a spreadsheet, you don't need to install or know how to use Excel to locate it. Document centers can be password protected for confidentiality. Use MarcoPolo to create the document center, indexing and compressing the items you put into it. Then, use MarcoPolo as needed to retrieve the document images. You can view any MarcoPolo document as a thumbnail, just by clicking the name in the dialog box list. You can even run QuickTime movies and sound files within MarcoPolo.

MarcoPolo functions with any Apple or TWAIN-compliant **scanner** to input all of your paper documents. It includes a sophisticated **OCR** (optical character reader) program that converts scanned text into a searchable file. It also accepts documents that are currently on your Mac in any printable format. MarcoPolo can automatically generate its document images from many common file formats, from XTND translators, or by having the file

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"printed" to a Chooser application, called *MarcoPolo Creator*, which functions like a printer driver, printing the document image into the document center files.

Each image is accompanied by information that helps you locate it, including its owner, archival date, and assigned keywords. If access to a document is limited, it also has attached to its file a list of users who are permitted to view it.

To locate a particular item, use the Query box. Here, we are doing a search by date and text for a document entered last month that contains the words "book" and "proposal" but not the word "Windows." The search should bring us a list of book proposals for Macintosh books. Because it's so specific, we're sure to find the exact item for which we're looking.

By combining several criteria, it's easy to construct a very detailed search. If this was a multiuser system with several people placing items into the document center, we also could search by owner. We could search multiple document centers, if we weren't sure where we'd filed it. Or we could search by a keyword, perhaps "book."

When MarcoPolo finds the document(s), it displays a list. Double-clicking an entry opens a mini-page view, which you can zoom to read at full size. Text used as a search criterion is highlighted. You can not modify a document image in MarcoPolo. However, you can print the document, or copy it to the Clipboard and import it into another application.

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# Margins and Tabs

Margins and tabs define the look of your document. Top and bottom margins define the amount of white space at the top and bottom of the document, and side margins determine the amount of white space at the sides. If a document is to be bound, you must leave extra space, called "gutter margins" or "binding margins" on the binding edge of the page. A two-sided document has the gutter margin on the left on odd-numbered pages, and on the right on even numbered pages. Margins can be set in a dialog box, from a ruler, or by dragging them into position on the page in page view. It depends on which program you're using.

Tabs are used to line up text. There are four common types of tabs: left, center, right, and decimal. Left, center, and right refer to the position of the text relative to the tab stop. They are set differently in the various word processor and DTP programs.

The left tab stop is at the left of the tabbed text. The center tab stop centers the tabbed text around it. The right tab stop is positioned at the right of the tabbed text. The decimal tab is used with a column of figures. The decimal points line up at the tab stop position, so that the number columns are always in line.

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Never use the spacebar to line up columns of text. Use the tabs instead. Spaces almost always come out uneven, whereas tabs always line up.

***See Also***
Leaders


# Mario Teaches Typing

Remember Mario? He and brother Luigi raced through strange worlds, kicking turtles and grasping stars in an attempt to rescue a princess. Well, he's back, along with Luigi and the Princess, only this time their world revolves around teaching kids to type. But they accomplish this in typical Mario style, with everything from turtles and blocks to quicksand and hungry fish who want our hero as a snack. This program combines the fun of an arcade game with the mechanics of touch typing. The animation is cute and the music and sound effects are similar to the ones in the game. But it might have been more useful to have the letters spoken as you typed them, or at least some definite right or wrong feedback. Still, once you get into it, the rhythm of the music helps keep you moving along, and you get your score after each two minute "round" of typing. There are three levels. In the first, you practice individual letters, while you kick turtles and jump on boxes.

In the second, you're typing real words and avoiding sharks and octopuses underwater. At the third level, you must type full sentences, as you work your way through an underground tunnel full of traps. The program can

handle any number of students and will print out achievement certificates as they reach each of the three levels.

***See Also***
Software, Educational, Adult; Software, Educational, Grades 7-12; Software, Educational, Pre-School; Software, Educational, K-6

# Marionet

An **XCMD** from **Allegient** Technologies, Marionet provides a scriptable interface to the Internet. The XCMD works with **SuperCard**, Apple **HyperCard**, and Macromedia **Director**, as well as programs that support **AppleScript**. Marionet supports several standard Internet protocols, including **World Wide Web** (**HTTP**), Newsgroups (**NNTP**), **Email** (SMTP/POP3 including APOP), File Transfers (**FTP**), Domain Name Services (**DNS**), and Searching (**Gopher**).

Marionet makes it possible to create an end-user interface for the Internet, such as a custom browser or mail program, or custom programs, such as on-line games or an electronic-directory that connects to the Internet for latest product information.

Allegient charges a license fee for commercial distribution of the XCMD: $500 per year for less than 500 users, and unlimited distribution for $1000 per year.

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Marionet requires a **TCP/IP** connection, a 68020 processor greater, System 7.1, and at least 750K for the Marionet application. A **Windows** version of Marionet is under development.

## Markkula, A.C. "Mike"

Armand Clifford "Mike" Markkula was one of Apple's first investors. After making his fortune at Intel and Fairchild Semiconductor, he came out of retirement to help finance Apple Computer.

Following **Ron Wayne**'s pullout from the original Apple partnership, **Steve Jobs** began looking for other investors. He spoke with Nolan Bushnell, his former boss at Atari, who recommended that he speak with venture capitalist Don Valentine. Although the two scruffy-looking kids in a garage didn't interest Valentine, he referred Jobs to Markkula.

Markkula apparently liked what he saw, and promptly invested $92,000 of his own money, with a commitment of up to $250,000. In return, he was given a one-third interest in Apple. When Apple went public in December 1980, Markkula got more than a 55,000% return on his initial investment.

Markkula helped Jobs create Apple's original business plan and has been closely involved with Apple ever since. He has generally preferred to stay out of the spotlight that is frequently on the leaders of Apple, but has always had a say in Apple business plan and strategy.

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Originally, Markkula served as chairman of the board while **Mike Scott** was president. From 1981 until 1983, he served as president, during which time Jobs was chairman. When Apple recruited **John Sculley** to the positions of chairman and CEO, Markkula stepped aside. During **Michael Spindler**'s reign as president, Markkula again held the position of chairman. Most recently, Markkula stepped aside again when **Gilbert Amelio** became chairman and CEO in 1996.

***See Also***
Amelio, Gilbert; Jobs, Steve; Scott, Mike; Sculley, John; Spindler, Michael; Wayne, Ron

# MarkUp

MarkUp is a tool for editors and anyone else who must review and make comments on documents. It's perfect for workgroups who share responsibility for reports and other files and must collaborate on their production. It enables users to edit, annotate, and review a document on transparent overlays, rather than making changes or notes directly on the page. Doing so means that the author can read the suggested changes without losing the original work. MarkUp also supports QuickTime and voice annotation, so a reviewer can add spoken comments rather than written ones, with a placeholder to indicate that there's a message to be heard.

Documents for MarkUp review can be created using any application. The

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user also can attach a limited version of MarkUp to a particular document, so that reviewers who do not own the program can still use it to review and edit that document. MarkUp runs on virtually any Mac from the Plus on up, and requires only System 6.0.4 or later. You can even install MarkUp as a menu option in your favorite **word processor** or other application. It works with spreadsheets, graphics programs, text files from an **OCR** scanner, or almost any other program from which you can open and print a document.

The procedure for creating a MarkUp file is simple. Open the document, and use the Chooser to open the MarkUp Creator, which acts like a printer driver. You'll "print" a MarkUp version of the document to your hard drive. Then, you can open it and make your edits. There's a fully editable menu of proofreader's marks, and even a palette of fun marks, including a pig, thumbs up, a trash can, a light bulb to say bright idea, and many more. You can create your own palette of marks, selecting from these and the common proofreader marks. You also can modify the marks or replace them with others, using the marks editor to redraw them at 16x16 pixels. Reviewers can leave notes in a journal attached to the MarkUp document, explaining what they have done to it. The journal stays with the MarkUp document. Click a proof mark to select it, and then click the document to place it. You can type in comments directly on the document, too.

After all the reviewers have finished, you can display each marked overlay separately or merge them all together. Open the original document next to the MarkUp version and make the changes you want to make. You still have your original text, no matter what the reviewers have done to hack it up. You

can copy significant changes from the MarkUp version and paste them into the original document.

The advantages to using MarkUp are many. There's no wasted paper. The document can be passed around on a network or by email. There's a record of the editing sessions, and you can tell immediately who said what. MarkUp enables reviewers to look at each other's comments, so there's a synergistic effect, resulting in a much better piece of work.

# Marlais

***See***
Dylan

# Martin Hash's 3-Dimensional Animation

A low priced ($199!) version of Hash's 3D character animation tool **Animation Master** . This program lacks high-end compositing and imaging features, such as sub-pixel averaging and network rendering options of its more expensive sibling, but otherwise it offers the same interface and features.

If you are interested in character animation, then either this program or Animation Master are probably your best choices. They support **inverse kinematics** , and you can create a script for a character; a set of instructions

that defines how a character walks.

Unfortunately, the program is very complex, and the documentation is limited in a video tape, a couple of electronic tutorials (which only cover very specific areas and don't give a complete introduction) as well as online help which is probably only of use once you understand all the concepts.

There has been some effort to create additional documentation by users, so check out Hash's Web site for copies of these documents. For more description of how this program works, read the entry for Animation Master

*See Also*
3D; Animation; Animation Master; Extreme 3D; Infini-D; Inverse Kinematics; Ray Dream; Sketch!; StrataVision

# Master Juggler

Master Juggler is a commercial **font**-management tool developed by Alsoft, Inc. (P.O. Box 927, Spring, TX 77383. (713) 353-4090) that enables you to use and organize fonts. A key feature is its capability to store and use fonts in any location on a disk, rather than having to store all your fonts in the Fonts folder within your System Folder.

Master Juggler, like its main competitor **Suitcase** , enables you to create font sets, turn these font sets on and off individually or in groups, renumber font IDs to eliminate font conflicts, and customize your fonts from outside the

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System Folder.

*See Also*
Font; Font Utility; Suitcase

# Master Pages

Most page layout applications allow users to set up nonprinting pages that can be used as templates to create any number of body pages with the same basic structure.

This feature is useful when composing books or other documents with large number of similar pages. A user might design a master page for chapter openers, one for lefthand text pages, one for righthand text pages, and others for special purposes such as multiple-column indexes.

Common elements on master pages include page numbers; running headers and footers; graphic elements such as rules, logos, and blind tabs; and boxes or guides to hold text that body pages will contain.

Most page layout packages offer some degree of assistance setting up master pages. For example, most offer a way to number pages automatically.

- To make automatic page numbers in **QuarkXPress** , type Command-3 on a master page. This will produce the characters "<#>" on the master page and the correct page number on any body page to which that master is applied.

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- In **PageMaker** , type "#" on any master page.

- In **FrameMaker** , insert the "Current Page #" variable by typing Command-B, selecting "Current Page #," and clicking on "Insert."

Other master-page related features include the ability to insert other "variables" on master pages that transform to text on body pages, such as the date or time, the total page count of the document, or the file name. Some packages, such as FrameMaker, allow master page variables to insert text from the main text flow in running headers or footers—so a dictionary, for example, could automatically have the first and last entries on each page appear in that page's running header.

***See Also***
FrameMaker; PageMaker; QuarkXPress

# Masterpiece Mansion

Philips' Masterpiece Mansion is an adeptly packaged cross between a game and an educational title. It qualifies as a game about art rather than an art CD-ROM because the basic premise lies in trying to gain access to more rooms in an art gallery. Each room presents a puzzle or trivia question related to its contents that helps you to better understand about famous works of art and the people who created them (see the following figure).

Masterpiece Mansion operates on the theory that kids will get more out of

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playing than they will by sifting through a boring reference title, reading entries and looking at quick video shots or cross sections (like you'd find in any old encyclopedia). Masterpiece Mansion is similar to Mortimer in that it is a sophisticated, non-violent game that appeals to a wide range of ages and can realistically be called family entertainment. Philip's other title in this genre, Merlin's Apprentice, would be a logical next step, Merlin's Apprentice moves further away from educational titles, but remains true to a family format for entertainment. Merlin's Apprentice is on the next level of puzzle gaming and includes excellent cartoon style animation.

### *See Also*
Are You Afraid of the Dark?; Family Entertainment; Foul Play; Mortimer; Yellow Brick Road II

## Math Coprocessors
*see*
Coprocessors, Types of

Mathematical Programs for Children, See Logical Journey, Math Munchers Deluxe, Math Workshop, Millie's Math House, Snootz Math Trek

## Matrox MGA Millenium
*See*

# M

QuickDraw 3D Acceleration Card

## Maven

Freeware developed by Charley Kline of the University of Illinois that brings audio broadcasting to anyone with a Mac and a connection to the **Internet**.

Maven, like **CU-SeeMe**, which brings videoconferencing capability to Internet users, requires a fast connection to the Internet to work properly—an ISDN or direct connection, which is faster than dial-up modems using **SLIP** or **PPP**. An **ISDN** or faster connection is recommended.

CU-SeeMe has incorporated Maven's code into its own software to add audio capability for its users.

Mac users with versions of the MacOS earlier than 7.5 should get the current version of the **Sound Manager** before using Maven.

*See Also*
CU-SeeMe; Internet; ISDN; MacTCP; World Wide Web

## Mavis Beacon Teaches Typing

Mavis Beacon won't rap you across the knuckles with a yardstick if you miss a key, but she *will* teach you to type—painlessly. She'll teach your kids, too, in a separate program called *Mavis Beacon Teaches Typing for Kids*. Both of

# M

these typing programs are carefully planned to advance you as soon as you're ready. Mavis analyzes your mistakes and offers suggestions in the adult version. In the kids version, she just tells you how many stars you've earned and your speed. They're both clever programs. Mavis for adults includes an arcade game in which you drive a race car by typing quickly, and a series of interesting stories and bits of trivia to keep you involved in what you're typing. You can choose to learn either the standard QWERTY keyboard or the Dvorak keyboard, a system developed in 1936 by August Dvorak to increase typing efficiency.

Mavis for Kids uses a variety of adventures and activities to teach basic (QWERTY) keyboarding skills. To use this program at the beginner level, the child doesn't even need to know how to read. It begins with single letters, works up to short single words, and finally to real stories.

Mavis for Kids has cute animation and sound effects, but (in the Power Mac version) some of the most awful music ever recorded. You can, however, turn the music off in the Preferences box. Mavis for Kids has some kid-proofing features, which are also set in the Preferences box. You can set the program up so the child can't quit, and so that he can't print from the program.

The problem with this, and with all computer typing tutors, is that it can't recognize a single mistake in a row of typed words. If you make a mistake, and don't immediately go back and correct it, everything you type from there on is wrong. This leads to, at worst, some discouragement and lousy wpm scores. It's not a serious problem, but simply one the typing student

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needs to be aware of.

# Maxis

***See***
Sim Games, SimCity 2000

# Maxsurf Plus

Maxsurf Plus from Graphics Magic Software is a very high end CAD program targeted towards the naval architect, though it has potential uses for the general Mac animator and 3D sculptor because of its control over the creation of splined surfaces. As if to suggest that possibility, a sculpted car body is included with the object files along with a dozen ship hull models.

*Dimensioning* Maxsurf Plus has no capability for dimensioning or dimensioning callouts. Maxsurf must be ported to other CAD software for dimensioning. Care should be taken to export the object data in a format that the targeted dimensioning software can read.

*3D Options* Maxsurf's perspective window features a realtime animation option that shows the selected object spinning in 3D. When stopped at a chosen perspective, the object can be seen from the direction the user desires. The perspective window is Maxsurf's only 3D option.

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*Text* The text style and size for Maxsurf data tables can be selected and altered. There are no text options for other view data as Maxsurf has no on-board dimensioning capacity.

*Import/Export* Maxsurf exports data files with the copy command in the editing menu, a method that might be a bit confusing to experienced CAD users. Selecting "Copy" brings up a list of format choices: Clipboard, PICT, IGES (International Graphics Exchange Standard), DXF, Mac Renderman, and PostScript. The scale of the exported file can be altered at this point in the same dialog. When a selection is made, a standard save dialog is presented (except if the choice is "Clipboard" of course). Imports are limited to getting data from the Clipboard. Maxsurf also saves and opens files in the Maxsurf format.

*Rendering Options* Maxsurf displays a rendering menu that allows you to choose Shading On/Off, Gaussian, Transverse or Longitudinal curvature, Convexity, and the optional display of Surface Contours and Positive/Negative values. It also allows brightness level settings (1 to 10). Rendering is displayed on screen, and is also sent to targeted print media.

*Documentation* Maxsurf's 100+ pages of documentation comes in a three ring binder so that future upgraded data can be easily added. Various appendices deal with more technical topics.

*Special Features* Maxsurf includes special features needed by the naval architect for data manipulation and design purposes. Among these are printer and plotter setup preferences, control point control for the model,

interactive curve area controls, a calculation and markers window, control points data display, smoothing and straightening controls, alignment-masking controls, precision settings, surface controls (surface types, longitudinal and transverse capability), display and grid spacing controls. A frame of reference window (allows setting of Fore and Aft perpendiculars, Amidships, and DWL and Baseline for the design. Zero Point updating is also included).

## MayaQuest

This program from MECC, (the folks who produced **Oregon Trail** and the other Trail adventures…) is an excellent introduction to the geography and culture of Mexico and Central America. It replicates the adventures of a team of EarthTrek bicycle explorers led by brothers Dan, Steve, and Nick Buettner. MayaQuest lets students become detectives and explorers in search of answers to explain the collapse of the ancient Maya civilization. This learning adventure will take them on a virtual field trip of ancient ruins in Mexico, Guatemala, and Belize, as captured in over 1,500 photos and video clips from the actual MayaQuest expedition.

Along the way, students will have to make decisions, solve problems, and navigate rugged bike paths while keeping a sharp eye out for ruts, branches, and other hazards. They'll have assignments to complete as part of the trek, finding and reporting facts such as what color a temple was painted, what Mayan rulers wore, or how the Mayans played ball. They'll also learn about

# M

the rainforests and jungles and the many colorful birds, animals, and plants that live there.

The program's Multimedia Resource Tool enables kids to easily export any of the program's images, sounds, or text into their favorite word-processing or presentation software to create their own multimedia adventures. MayaQuest also offers a special feature for Internet users. The MayaQuest World Wide Web site (http://www.mecc.com/mayaquest.html) offers a wealth of additional information, photographs, and updates for the program with more adventures and additional items to search for. During the spring of 1996, the MayaQuest team will be making a second trip, sending daily reports and photos over the Internet to connected classrooms from a laptop computer and satellite transmitter. MayaQuest is a fascinating way to learn about the Mayan civilization, and because the program is bilingual English/Spanish, it's also a good addition to a language program.

***See Also***
Amazon Trail; Educational Software K-12; Oregon Trail

# MBDF Virus

This virus infects applications, the System file, and other resource files. Applications become infected as soon as they are run on an infected system.

***See Also***
WDEF

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## MBONE

A way of broadcasting or "**IP** multicasting" live audio and video over the **Internet** . Stands for Multicast Backbone on the Internet.

A virtual network of MBONE workstations send receive real-time communications and route them to other sites on the network.

Most of the software required to receive MBONE is currently designed for high-end UNIX-type workstations. In order to receive MBONE broadcasts you have to ask your Internet service provider if they receive MBONE. You also need a very fast connection to the Internet, such as a dedicated T1 or T3 line. Commercial products to make MBONE more widely available are expected to be developed in the near future. **CU-SeeMe** already provides Internet teleconferencing, however.

***See Also***
CU-SeeMe; Internet; World Wide Web

## MCL

***See***
Lisp

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## MDEF
***See***
Code Resource

## MDEF Virus
MDEF, also known as Garfield and Top Cat, infects applications, documents, the Desktop file, and the System file. Applications must be run in order to become infected. System crashes and distorted menus are both symptoms of **MDEF**.

***See Also***
ANTI Virus; CDEF Virus; CODE 1 Virus; CODE 352 Virus; Frankie Viru; INIT 17 Virus; INIT 1984 Virus; INIT 29 Virus; INIT 9403 Virus; INIT-M Virus; MacMag Virus; MBDF Virus; nVIR Virus; Scores Virus; T4 Virus; WDEF Virus; ZUC Virus

## Mean Time Between Failures
***See***
MTBF

## Mean Time to Repair
***See***

# M

## Mean Time to Service Return
*See*
MTTSR

## Mechanical
In the graphic arts, a mechanical is the construction of poster board and overlays containing the text and other graphic elements of a publication. The mechanical is photographed with a process camera to produce film for platemaking. Such an assemblage is also known as camera-ready art or a paste-up. Mostly replaced by **desktop publishing,** mechanicals require manual skills quite different from manipulating the **mouse** and keyboard.

*See Also*
Graphic Design

## MediaFactory 1.0
MediaFactory is designed as a simple-to-use **QuickTime** movie editor. For those who don't want to spend hundreds of dollars on Adobe **Premiere** , the alternatives are **MediaFactory** and **QuickFlix** . **VideoShop** , from Avid, is

another editing application.

MediaFactory uses the project and timeline metaphor found in Premiere, and offers 26 different transitions, but no cross-dissolve. A cross-dissolve fades the first clip into the second one and is probably the most common transition used in movie editing.

Also, the audio controls are limited to adjusting the volume of the audio for the entire clip (other programs enable you to adjust the volume at different points, creating volume fades). The program's interface is difficult to use. Radius's **QuickFlix** is probably a better buy.

Nuts Technologies
Price: $199
Phone: (408) 980-7800

*See Also*
QuickFlix

# Mediagnügen

While it is billed as a presentation program, Mediagnügen is essentially a multimedia browser. You can create catalogs containing up to 13,000 images, which might make it useful for indexing CD-ROM clip art collections, but because the program supports only **PICT** and **JPEG** files, there are serious limitations to the kinds of things you can index. Viewing and manipulating

# M

files in the catalog is not as easy as it should be, making this program sometimes awkward to use.

Gnügen Software
Price: $30
Phone: (303) 682-5380


# MediaPaint

Strata's MediaPaint sets out to establish ground breaking art and animation technology. MediaPaint gives users a wide selection of painting and effects tools designed to paint on QuickTime/PICT movie frames, with no alterations done to the underlying movie until after the paintings are complete and the new movie file saved. MediaPaint allows the Mac animator to paint state-of-the-art effects on video footage, which may later be transferred to film for major theater display. MediaPaint is also a vital tool for the multimedia and game producer who needs to incorporate the quality level of effects that the public demands in both interactive edutainment and entertainment. In addition to the program and documentation (including a tutorial manual), the package comes with an excellent tutorial videotape and two CD-ROMs. The first CD features sample movies created by MediaPaint masters, and gives you a feel for the power and potential of the software. The second CD is called "Special Effects" and it contains seven new tools and eleven new filters which we will describe in detail below. MediaPaint movies can also be created from single PICT images using the "Auto Advance Point" in the software. This

# M

feature automatically inserts succeeding frames of the image, updating the painting effects as they are being used. No Mac animator, multimedia or game developer should be without this software.

MediaPaint's toolbox looks familiar at first glance because it contains many of the same standard tools found in a digital painting program (Move hand, Zoom magnifier, Line, Area Fill, Shape Icons, Color Selector, Eraser, Text, Area Select Tools), but a closer inspection reveals an unfamiliar set of options as well. There are three Tool Modifiers (Shrink, Layer, and Composite), an Anti-aliasing chooser, a Corner/Center tool for polygon creation, and a Line Weight pop-out. Below the recognizable Toolbox is where the interactive fun really begins. A scrolling area reveals a collection of named icons for a more expansive list of tools. Each of these tools is connected to a design dialog that can be accessed simply by double-clicking on the associated icon. The following data gives you a good idea of where these tools could be used. In most cases, a live animated preview allows you to paint and view the effects chosen.:

*Airbrush*—No Preview. You may select from a standard airbrush or a pixelated flow. Sliders can be used to adjust Size, Pressure, Flow, Step, Softness, Edge Opacity.

*Arcs*—You would use this anywhere that arcing electric current is needed as an effect. PreSets include Power Surge, High Tension, Tesla Coil and Jupiter's Storms. In addition to the PreSets, you can design your own arcs by altering Width, Branching, Writhe, Zagging, Tip Glow and Heat.

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*Babyboom*—This effect looks like fireflies or small meteorites glowing and then fading out. You can design the elements by altering Size, Noise, Opacity, Speed, Chaos, Fertility, Density, Lifespan, and Particle Trails.

*Beams*—You can either design your own effect or use the PreSets that include Laser, Photon Blast, Light Saber, Pulse Cannon. The names of the PreSets should give you a good idea of where these could be used. No science fiction producer should leave home without these effects. You can alter Width, Taper, Pulses, Chaos, Amplitude, Speed, Heat, and Glow.

*Blur*—No Preview. The effect can be altered by Pressure and Steps sliders. Use it when you want to blur the underlying frame(s).

*Bubbles*—PreSets are Scuba, Soap Bubbles, and Soda. Each produces animated bubbles that cover the effect. You can customize bubbles by altering Size, Distortion, Number, Buoyancy, Lighting Direction, Growth, Shrinkage, Wobble, Turbulence, Opacity, and Hilight.

*Burn*— No Preview. This is a photographic darkening effect. You can adjust the Exposure and number of Steps on Shadows, Midtones, and Hilights.

*Diffuse*— No Preview. This effect randomizes the spread of color or pattern when applied. The effect can be altered with Spread and Step sliders.

*Distort*— No Preview. This is a smear effect for color or pattern painted down. Distortion and Step can be adjusted.

*Dodge*— No Preview. This is the opposite of the Burn effect, and the same

parameters can be altered.

*Fade In*— No Preview. This increases the opacity of the paint when used on the Alpha level. The current brush is used. Pressure and Step can be altered.

*FadeOut*— No Preview. This decreases the opacity of the paint when used on the Alpha level. The current brush is used. Pressure and Step can be altered.

*Fine Brush*— No Preview. Allows you to fine tune the settings of the selected brush. Pressure, Flow, and Step can be altered with sliders.

*Fire*—this effect can be applied to any element that needs to look like it is on fire. You can use the PreSets (Campfire, Candle, gas Flame, Oil Fire, and Wick) or design your own customized flames. You can control Height, Direction, Speed, Turbulence, Waves, and Heat.

*Fireworks*—Creates fireworks explosions on the movie frames. Varieties of fireworks effects include Sky Rocket, Boomer, Patriot, Boomer, and Star Halo. You can adjust the Burst for Size, Chaos, Trails, Flatness, Gravity, Parts, Radius, Flash, Wobble and Lifespan, and Rocket Size, Heat, Speed, Glow, Wobble and Trail. The color can change over time.

*Invert*— No Preview. Paints the selected area in a negative of the color used. You can alter Pressure, Flow, and Step.

*Lens Flare*— An exploding flare object. PreSets include Simple Star, Telephoto Lens, Simple Glare, telescope, Star Ship, and Sparkle. You can customize the effect by altering Flash Size, Rays, Chaos and Glow; Glare Number, Size,

Opacity, Chaos and Color. In addition, the flare can fade in and out.

*Lightning*— Use it to make lighting strike twice in the same place. PreSets include Rainstorm, Power Arc, High Energy, and Argon Strike. You have control over Width, Forks, Branching, Writhe, Zagging, Taper, Heat, and Glow.

*Magic Wand*—No PreSets. This is a standard Wand tool whose tolerances can be set.

*Pixie Dust*—use it to emulate the falling sparkles from the fairy Godmother's magic wand and like effects. Particle Attributes, Opacity, Pixie Dust Settings, Lifespan and Particle Trails can all be customized.

*Shape Painter*—This feature is exactly like the Image Hose in Fractal Painter, in that it paints down a group of images saved to a file and loaded into the tool. Use it to create cel animations or effects, depending upon the brushes loaded. Shapes can be applied randomly or in order, and their Pressure, Flow and Step can be altered.

*Sharpen*—No Preview. This effect is comparable to the sharpening feature in photoshop, and adds pixelated edges to the targeted area. Pressure and Step can be altered.

*Smear*— No Preview. Smears the selected area. Pressure and Step can be altered.

*Smudge*—No Preview. Smudges the selected area. Pressure and Step can be

altered.

*Spin Out*—Adds a group of spinning particles to the selected area. This is a great effect for producing atomic particle simulations and like effects. You can control particle Attributes, Opacity, Spinout Settings, Lifespan and Particle Trails.

*Squiggle*—Like writhing electric colored worms, this effect applies animated squiggling lines to the movie painting. You can control Squiggle Settings, Fade to Film Color, Stop Squiggling interrupts, Custom/Current Brush Settings and Line Spacing.

The painting that is accomplished in MediaPaint never disturbs the surface of an imported movie or graphic. It sits "above" the targeted surface on its own plane. Only when the completed work is saved and loaded in again is the targeted movie or graphic and the painting done on it fused. You can even save a MediaPaint project with both surfaces intact.

*Stencil Painting* MediaPaint allows you to use a movie as a paintbrush to paint another movie. One use might be to create two animations, a wireframe and a fully rendered view of the same scene. Use the wireframe as a base, and apply the rendered movie in steps over the wireframe movie, slowly revealing rendered detail. The result would be a movie that displays a wireframe evolving into a fully rendered animation, an effect major studios used in both commercial and entertainment venues. All of MediaPaint's tools are available for stencil painting. Care should be taken to use two animations of the same display size and the same number of frames.

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*Other Uses* Movies can be constructed from scratch on blank frames. These movies can then be used as underlays for further effects. Single graphics files can also be targeted for any of the effects included.

*File Load / Save Conventions*

Files can be saved as MediaPaint files, QuickTime movies, or as numerated PICT files.

# MediaTime

A NuBus video digitize and display board that includes 16-bit audio hardware based on Digidesign's **AudioMedia** card. This card can accept daughterboard cards, such as the **MoviePak** , which provide hardware compression and QuickTime movie playback. The MoviePak board displays full frame, full motion video, although it actually only captures an image 1/4 the size of the full screen size, and then doubles it to provide the full screen image.

This board is no longer manufactured; software and an FAQ is still available at the RasterOps home page: http://www.rasterops.com.

Memory, Allocation in 680x0 Macs

The Macintosh reserves a certain amount of memory for the operating system, depending upon the version of the system you are running. This memory is used to load portions of the system, the Finder, and those system extensions required by your work. This software remains in memory while

you are working. The allocation of space is dynamic, meaning that it changes as the requirements of your work session change (which applications do you want open, how many documents, are you printing at the same time, and so on). RAM is allocated in 512K blocks, thus the system may reserve more memory than it needs. To check how much memory your system is reserving, pull down the Apple menu and highlight About This Macintosh (the first item in the list).

In System 7, the About This Macintosh dialog box also displays an alphabetical list of items which have been assigned a memory *partition*—blocks of memory reserved for that item. The black part of the bar shows how much memory is currently in use.

These partitions are assigned on a first-come, first-served basis. Each application requires differing amounts of RAM to operate properly. (To check to see the amount of RAM required or to change the RAM allocation to better fit your RAM availability, click the application, pull down the Get Info command from the File menu. You can type a new number in the Current Size box based on the data reported in the Suggested Size box and your requirements.

Note that the more memory available to a program, the more efficiently it will operate.

Some applications load all of their documents into RAM at one time, and other programs place only portions of a document into RAM and swap "pages" back and forth from the disk to RAM as they are needed. The space needed to load

the documents is taken from the allocated partition space for that application.

Fragmentation occurs in RAM in the same fashion as it occurs in storage. When you open and close multiple applications during a work session, the blocks of RAM are taken and freed up randomly. This causes a problem, because applications need contiguous areas of RAM to operate—they cannot use scattered blocks of memory. You defragment the memory by quitting your applications in the order they were opened, thus laying out the RAM in its proper sequence once again. You must remember this order, because the Macintosh will not provide you with guidelines. As a rule of thumb, open the programs you use most continuously first, and then open applications of lesser importance. You are less likely to create holes in the RAM with this practice.

Note that there is very little correlation between the size of the physical program stored on the disk and the amount of RAM it requires to function. You must use Get Info to learn how much memory a program requires

***See Also***
Hard Disks; RAM; Virtual Memory

# Memory, Allocation in Power Macs

The PowerPC processor uses a new Memory Manager and a revamped way of loading applications into memory. If an application was originally written

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for a 68K Mac and has not been rewritten to take advantage of the PowerPC, then it stores its code in the CODE resource and uses the Segment Loader to load these CODE resources into a memory partition.

If the application has been rewritten to take advantage of the new Memory Manager of the PowerPC, then its executable code is stored in the data fork of an application file. The software is then divided into chunks, called fragments, which can be loaded as needed. This method of loading applications into memory also enables the PowerPC software to use virtual memory more efficiently, because it reuses the data fork of the application as a paging file to improve performance. With virtual memory on, only the needed portions of code get loaded into memory, reducing the memory requirements of that application.

***See Also***
Hard Disks; Memory Partitions; Paging; RAM; Virtual Memory

# Memory, Capacity and Expansion

RAM resides inside the Macintosh on special circuit boards. Older Macs, such as Quadras, some LCs, and first generation Power Macs use circuitry called *single inline memory modules* or **SIMMs**. Second generation Power Macs use a more advanced type of chip called a dual inline memory module or **DIMM**.

The reason that RAM does not retain its data when the power turns off is that most memory chips are *dynamic RAM* or DRAMs which must be constantly

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powered by electricity to continue holding data. DIMMs and SIMMs are sized in kilobytes and megabytes which measures the density of the chip, that is, its capacity to store data.

Although chips are spoken of as being multiples of *bytes* of capacity, in actuality, chip density is measured in *kilobits*. (Kbit) and *megabits* (Mbit) There are several densities of DRAMs available. Each Macintosh family can use only a certain density, with the older Macs, such as the Plus or Macintosh IIs capable of using only the lowest density and the newest Power Mac family of processors capable of using up to the highest density. Thus, the type of Macintosh you own determines the type of DRAM density you are able to upgrade to. The most common DRAM chips come in the following densities.

(Note that the Density column measures the amount of kilobits or megabits a chip can store and the Memory Capacity column measures the total number of electronic switches this is equivalent to, each of which can be a 0 or a 1. Memory Capacity is calculated by multiplying the Density by the number of bits in a kilobit (1,024) or megabit (1,048,576).)

DRAM Density

| *Density* | *Memory Capacity* |
|---|---|
| 64Kbit | 65,536 bits |
| 256Kbit | 262,144 bits |
| 1Mbit | 1,048,576 bits |

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| 4Mbit | 4,194,304 bits |
| 8Mbit | 8,388,608 bits |
| 16Mbit | 16,777,216 bits |
| 32Mbit | 33,554,432 bits |
| 64Mbit | 67,108,864 bits |

Each SIMM has eight memory chips soldered on to its surface and each DIMM has sixteen memory chips soldered on its surface. Thus, on each SIMM or DIMM, depending upon its density, you can store: 512Kbits, 2Mbits, 8 Mbits, 32 Mbits, or 64 Mbits. Chips are tied together for a combined memory capacity so that it takes 32 256-Kbit DRAMs or eight 1-Mbit DRAMs to make 1 megabyte of RAM, Macintoshes measure their RAM capacities in these larger units. When a computer salesman speaks of the upgradability of your Macintosh as "slots," he is speaking about the number of spaces on the internal communications connection, or *bus* where these memory modules can be inserted. The Macintosh Plus and SE were the first Macintoshes to use SIMMs.

Prior to these models, Macintosh memory was soldered on to the logical board in individual chips (with capacities of 128K and 512K) and no upgradability path. *Note that the address capacity of the operating system limits the Macintosh to 8MB of RAM if you have not loaded System 7 and turned on its 32-Kbit addressing capability.* With 32-Kbit addressing, the Macintosh can address up to a gigabyte of RAM.

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Each Macintosh model has specific memory configuration rules. You can only install RAM modules in certain combinations on each model. The following table contains the basic rules; dealers and companies that sell DIMMs and SIMMs have complete details.

Macintosh Memory Configurations*

Model (Soldered RAM / Expansion Slots / SIMM Sizes (MB) / Total RAM Available (MB))

Performa 550

(4 / 1 SIMM / 1, 2, 4, 8, 16, 32MB / 4, 5, 6, 8, 12, 20, 36)

Quadra 605, LC 475, Performa 475, Performa 476, LC 520

(4 / 1 SIMM / 1, 2, 4, 8, 16, 32MB / 4, 5, 6, 8, 12, 20, 36)

Quadra 610 (Centris 610)

(4 / 2 SIMM / 4, 8, 16, 32MB / 4, 8, 12, 20, 36, 40, 44, 52, 68)

Quadra 650, 800

(8 / 4 SIMM / 4, 8, 16, 32MB / 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 104, 108, 112, 120, 136)

Quadra 660AV (Centris 660AV)

(8 / 8 SIMM / 4, 8, 16, 32MB / 4, 8 ,12, 20, 36, 68)

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Quadra 840AV (Centris 840AV)

(0 / 4 SIMM / 4, 8, 16, 32MB / 8, 16, 32, 64, 128)

Quadra 900

(4 / 16 SIMM / 1, 4, 8, 16; 88, 96, 100, 112, 128, 132,160, 192, 196, 208, 256MB / 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 52, 64, 68, 72, 76, 80, 84, 136, 148, 256)

Quadra 950

(0 / 6 SIMM / 1, 4MB / 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 48, 52, 64)

Power Mac 6100

(8 / 2 SIMM / 4, 8, 16, 32MB / 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72)

Power Mac 7200

(8 / 4 DIMMs / 4, 8, 16, 32M / 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72)

Power Mac 7500, 8500

(16 / 8 DIMMs / 4, 8, 16, 32MB / 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80)

Power Mac 9500

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(16 / 12 DIMMs / 4, 8, 16, 32, 64MB / 20, 32, 48, 80, 112, 144, 208, 400, 768M)

Performa 63x series

(4 / 4 SIMM / 4, 8, 16MB / 8, 12, 20M)

Performa 5215, 62300

(4 or 8 / 4 SIMM / 4, 8, 16MB / 8, 12, 16, 20, 24M)

Performa 61xx series

(8 / 2 SIMM / 4, 8, 16MB / 16, 24, 40M)

PowerBook 190

(4 or 8 / 1 / 4, 8, 16, 32MB / 8, 12, 16, 20, 24, 36, 40M)

PowerBook 5300

(8 / 1 / 4, 8, 12, 16, 32, 48MB / 12, 16, 20, 24, 40, 56M)

PowerBook Duo 270c

(4 / 1 / 4, 8, 12MB / 4, 8, 12, 16MB)

PowerBook Duo 2300

(8 or 20 / 1 / 8, 16, 24, 32, 40, 48MB / 16, 28, 24, 36, 32, 44, 40, 52, 48, 60, 56, 68MB)

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All of this abundant memory is not simply thrown open for the use of programs, but is controlled by the Finder and specifically assigned different roles.

***See Also***
DIMMs; Memory; Power Mac; RAM; SIMMs; Virtual Memory

# Memory Control Panel

This control panel enables you to adjust four separate areas of the Macintosh's memory features: The disk cache, the Modern Memory Manager, Virtual Memory, and RAM disk functions.

The **disk cache** is always on, but you can select the amount of memory that is set aside for cache memory to speed up CPU-intensive operations.

The next section enables you to toggle on and off the Modern Memory Manager on Power Macs (On non-PowerMac models, the Modern Memory Manager toggle is not present, and the 32-bit addressing toggle is in its place). The Modern Memory Manager, which is in the on position by default, is a completely rewritten native version of the previous Memory Management code found in operating systems previous to System 7.1.1. The Modern Memory Manager offers better performance than the previous Memory Management code because it runs in the native PowerPC environment. If you toggle the Modern Memory Manager off, the prior version of the Memory Manager, which is burned into the RAM of the Mac,

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will be used instead.

**Virtual Memory** can be toggled on and off from the Memory Control Panel, and you can select which hard disk you want to use and the amount of disk space you want to dedicate to Virtual Memory. You can also toggle the **Modern Memory Manager** on and off here and set up a **RAM** disk if you desire.

To use the Memory Control Panel, follow these steps:

1. Select Memory from the Control Panels submenu on the Apple menu (or System Folder).

2. To set the amount of disk cache, use the edit arrows to click the edit arrows in the direction you want the numbers to move.

3. If you want to enable virtual memory, click the On button and choose which hard drive will be used for virtual memory and how much virtual memory will be used. (A **restart** is required to activate virtual memory.)

4. To enable the Modern Memory Manager, click the On button.

5. To set up a RAM Disk, click the On button and drag the slider to select the percentage of available RAM you want to designate as a RAM disk. Upon restart, your RAM Disk is enabled.

### See Also
32-Bit Addressing; Apple Menu; Cache; Edit Arrows; RAM; RAM Disk; Restart;

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Virtual Memory

## Memory Interleaving
*See*
SIMMs and DIMMs

## Memory Leak

A memory leak is a **programming** error in which memory is allocated but never properly released.

Suppose, for example, that an application needs an extra block of memory whenever a certain dialog box is open. When the dialog is opened, the application requests a block of memory from the System. When the dialog is closed, the application should free the memory to let the System know it's no longer using it. If it fails to do so, the System will continue to treat the memory as though it's still in use, effectively putting that block of memory out of service. Each time the dialog is opened, another bit of memory is leaked.

Memory leaks are fairly common. Minor memory leaks can easily remain unnoticed even in commercial software, but serious leaks can bring an application to its knees in a split second.

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# Memory Management Unit (MMU)

# Memory Mine, the

A memory analysis and **debugging tool** from Adianta, Inc.

The process of **debugging** a Macintosh application can be especially difficult if you don't have a way to observe your application's memory usage while the program is running. The Memory Mine provides a vast array of memory usage information about any running application.

The Memory Mine is a **heap** monitoring tool similar to Metrowerks' **ZoneRanger** . Like ZoneRanger, you can use it to watch the contents of any application heap as the program runs.

When it is monitoring an application, The Memory Mine does not interfere with its operation in any way. Memory Mine's statistics display is updated constantly in the background to give you the latest information about the contents, consistency, and fragmentation of the heap. In addition, The

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Memory Mine can keep track of the "high water mark" of memory allocations, including the maximum number of **handle**s allocated and the maximum and minimum free memory.

The statistics collected by The Memory Mine are shown in the statistics window, and they also can be collected into a log file. This is an excellent way to keep track of an application's memory usage over time.

Finally, The Memory Mine can perform a variety of stress-testing functions, including scrambling, purging, or compacting the heap or allocating memory blocks of any size in the heap.

The Memory Mine is published by Adianta, Inc.:

Adianta, Inc.
582 Market Street #911
San Francisco, CA  95104
Email: adianta@aol.com
Fax: (415) 781-8053
Phone: (415) 781-8052

*See Also*
Bug; Debugging; Debugging Tools; Handle; Heap; ZoneRanger

# Memory and Storage, Difference

Like all computers, the Macintosh separates the location where the work is

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performed—called *memory* or **Random Access Memory (RAM)** from where it resides—called **storage**. The important concept to remember about RAM is that it is *volatile* storage, meaning that it does not retain its contents when the power is turned off. *Non-volatile* storage retains data in a physical way and so does not lose its contents when the electricity is turned off. In order to retain what you have done in volatile memory, a file must be returned to its non-volatile (or permanent) storage area by *saving* it (writing it to disk).

Memory also differs from storage in that it resides in the computer as a series of memory chips on the **motherboard** (also called the logic board, where the rest of the critical components that make up the microprocessor are located, such as ROM, bus controllers, memory controllers, and so forth) and on related circuit boards in other slots. Because it physically connects to the computer, it provides a very fast access time to match the computer's exceedingly fast performance time.

Storage, on the other hand, resides outside of the computer, (although some may be placed inside the physical container that also holds the *computer processing unit* (CPU)). Thus, storage is slower at sending and receiving data than is memory, because it must rely on physical connections—motors, magnetic sensors, moving arms, and spindles to connect it to the computer. Another difference between the physical storage of data and the electronic storage of data is that physical things have a greater chance of breaking than electronic things. Thus storage is more liable to damage than memory.

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Another difference between memory and storage is the size differential. Before System 7's **32-bit addressing** and **virtual memory,** memory was limited by the size of the address registers of the computer. On the other hand, storage was limited only by the price you wanted to pay. Today, the size difference is blurring, because storage can be loaned to memory as virtual memory.

***See Also***
DIMMs; Hard Disks; Memory; RAM; SIMMs; Virtual Memory

# Memory and Storage, Measurement Methods

All computers perform their functions by turning on and off electronic pulses (whether by changing their polarity or literally switching signals on and off). Data to the computer is merely a series of electromagnetic signals corresponding to electromagnetic fields that line up on positive and negative poles. These fields can be viewed as a sequence of zeroes and ones representing the positive and negative signals. The mathematics of computing is based upon this dyadic system.

The basis of computing is a mathematical system called Boolean Algebra which is designed around the *base-2* or a *binary* way of counting. This mathematics describes how a computer physically manipulates data as well as

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the capacity of memory to store information, or its density. A shorthand term for *binary digit* is the word *bit*,—the smallest unit of measurement in computing, $2^1$ or 01. All memory stores data in bits on computer chips and all storage media stores bits of data on magnetic materials.

You probably have heard the term *byte*. A byte is the next larger measurement unit, equal to eight bits ($2^8$—256 bits) of information. Each byte represents a single character in text. Thus, when we speak of a character of data we mean one byte of information. One thousand bytes is a *kilobyte* (actually $2^{10}$ or 1024 bytes) of data. Typically, the Macintosh reports its memory in both bytes and kilobytes or "K"— actually 1,024 bytes. A word is two bytes (six characters plus an extra bit) and 1K equals approximately 170 words of data.

The Macintosh requires large numbers of bytes of memory to temporarily store the application you are using, the operating system performing the work, and the document you are working on. Memory is installed in the next larger measurement unit—a *megabyte* or $2^{20}$ (over one million or 1,048,576) bytes or 1,024 kilobytes. To use System 7 you need at least 2 megabytes (abbreviated MB) of RAM and more RAM enables you to open more applications at one time in this *multitasking* environment (meaning the capability to run more than operation simultaneously). Even System 6 required at least 1MB of RAM to run individual applications and the Finder and at least 2MB to use MultiFinder.

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Due to the growing size of documents, applications, and operating systems, Macintosh non-volatile storage is now measured in gigabytes (abreviated as "G"), or the capability to store $2^{30}$ bytes—over one billion (1,073,741,824) bytes of information.

***See Also***
Finder; Memory; Storage

# Memory Upgrade

A memory upgrade entails the addition of RAM to your computer, increasing the amount available to applications without invoking virtual memory. In most Macs, this memory is on SIMMs, but in the newer models, the memory is on DIMMs, and in a few PowerBook models, it was static RAM rather than dynamic RAM.

***See Also***
DIMM; DRAM; SIMM; SRAM; Virtual Memory

# Menu

The **commands** and features of a particular software application, or of the Macintosh **Finder**, are found on the application's menus, as shown in the figure. These menus, called **pull-down menus**, appear at the top of your screen in the **menu bar**, which has an Apple Computer logo on the far-left

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side. Each menu is listed by topic on the menu bar. Commands for creating new files or **saving** files, for example, appear on the **File menu**.

To see what's on a menu, click and hold the **arrow pointer** over a menu title in the menu bar. A menu of choices appears containing commands used to access the features of a program. If, for example, you're using an application and you want to **print** the document you're working on, click and hold the topic File in the menu bar to make the File menu appear.

On this menu you see the word Print. To select Print, continue to hold the mouse button down, **drag** the arrow pointer down to the Print command (a black selection bar moves with you so you can see which command you're selecting), and release the **mouse** button. Releasing the mouse button when you've selected Print tells the application that you want to print, and causes the Print **dialog box** to appear, enabling you to choose your printing options.

Each application has its own menu bar enabling you access to the features and commands of that program. Two menu topics are consistent throughout the Macintosh environment: the File menu and **Edit menu**. After the Apple menu, these are the first two menu topics in almost all Macintosh application menus. The Applications menu and the Help menu (both on the far right side of the menu bar) also appear in the menu bar when you're in an application.

### See Also
Arrow Pointer; Click and Drag; Commands; Dialog Box; Edit Menu; File; File Menu; Menu Bar; Mouse; Pull-Down Menus; Saving; Selections

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## Menu Bar

The menu bar is the white horizontal bar at the top of your screen.

The menu bar gives you access to **menus** and the **commands** they contain. The names and tiny icons appearing in the menu bar designate the topics, or titles, each menu contains. To access a menu from the menu bar, click and hold a menu title or icon, and a corresponding **pull-down menu** appears listing the commands available on that menu. To select a command from the menu, continue to hold the **mouse button**, **drag** the **arrow pointer** to the command you want to select, and release the mouse button. The menu command, **highlighted** in black, blinks to let you know you've made a selection.

The menu bar also contains the **Apple menu,** which appears on the Apple Computer logo icon; the **Help menu**, which appears on the question mark icon; and the **Application menu**, which appears on the far right side of the menu bar and displays the mini-icon of the active application. This menu enables you to select from an application from a list of running applications. In System 7.5 and higher, a menu bar clock is built into the system and can be toggled on and off from the Date & Time control panel. Prior to System 7.5, most Mac users used a freeware control panel called SuperClock to put a clock on their menu bar.

The menu bar has different topics, or titles, in each application as software developers use the menu bar to give customized access to features of their

application. However, two menu bar titles remain consistent throughout most Macintosh applications: The **File menu** and the **Edit menu** , which, after the Apple menu, are the first two menus in the menu bar.

*See Also*
Apple Menu; Application Menu; Desktop; File Menu; Edit Menu; Help Menu; Highlight; Menu Commands; Menus; Mouse; Pull-Down Menu

# Menu Commands

There are two basic types of **commands** in the Macintosh environment: keyboard commands and menu commands. Keyboard commands are instructions for the computer that you enter by pressing keys on the keyboard. Menu commands are selected from either **pull-down menus** (which appear in the **menu bar** at the top of the screen in an application or the Finder) or **pop-up menus** , which appear in **dialog boxes** . Many menu commands also have a keyboard shortcut which enables you to select a menu command from the keyboard without using the **mouse** to go up to the menu bar and select it manually. If a menu command has a keyboard shortcut, the shortcut is generally listed to the right of the command in the menu.

*See Also*
Commands; Dialog Box; Keyboard Shortcuts; Menu Bar; Pop-Up Menus; Pull-Down Menus

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## Menu Sharing
***See***
Frontier

## Merlin's Apprentice
***See***
Masterpiece Mansion

## MeshPaint
MeshPaint allows the 3D artist to paint objects in real 3D. It is the first of its kind, though it promises to set a pace and a concept that others are sure to follow. It is both Windows and PowerMac oriented, and supports **ElectricImage** and all 3D software that incorporates the **QuickDraw 3D** standard on the Mac (**RayDream**, StrataPro **Infini-D** and others). The process is simple. Load in an acceptable object saved out from one of the supported 3D programs, and use the 3D painting tools to paint on the object as you rotate it in 3D space. Though this seems simple, technologically it has taken decades to realize this potential for the desktop artist.

MeshPaint has a 3D window (used to manipulate the loaded object in 3D space) and a 2D window for each element of the object that has a separate painted or

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photographic texture, where the actual painting goes on. When painting is activated in the 2D painting widows, the 3D object is updated, though it may have to be re-rendered to see the results. The object at first appears as a wireframe construct in the 3D window, and responds to all manipulations performed on it in the separate 3D controls window. The wireframe may be shown as a single or multiple color. The polygonal structure of the wireframe can be set for varying detail in the Object Preferences dialog. Here you can set the color of the 2D window's background, the color/multicolor of the wireframe. The detail level is set by a slider, and ranges from 1 to 100. The higher the slider is set, the less detail you'll see in the wireframe, with a cost of slower movement operations because of redraw time. The top number can be set to higher values for larger objects. The way the slider is set makes a difference when painting on the object as far as the perceived detail of the polys, and can affect the way that you paint.

The 3D Object Preferences dialog also lists a shading menu. The mode may be set to flat (poly edges will be seen) or smooth (no poly edges will be visible when solid rendered). You can even select to see a shaded render all of the time on the 3D window instead of a wireframe. This is at a cost of slower rotational manipulations and successive redraws of the object.

**3D Object Manipulation**  MeshPaint has a special rotation control window so that you can see the object in the 3D window from any angle. It has three separate control sliders: one for zooming in/out, and the other two to rotate the object in 3D space. Exacting painting can be accomplished by keeping close tabs on a zoomed in view of the objects detail polys.

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**Painting Tools** All of the elements in an object first must be assigned a texture, and the texture has to be told how it must be applied (planar, spherical, cylindrical etc., and on what relative axis). Then paint is applied to 3D models by choosing a color or texture. Textures can be saved paintings or photographs, so MeshPaint makes it easy to apply facial maps to 3D humanoid models as an example. MeshPaint includes painting, straight line, fill and blur tools on screen, and the revisions that will accompany each edition of this software are sure to include more painting tools and options.

All imported graphics are shown in their own 2D window, and the painting tools can be used to alter them on the spot. Brushes are loaded in specific libraries, and can be created externally in a paint program and saved to MeshPaint. Once a surface of the object is married to a texture, painting can be targeted to that surface, and it will map in the way that was selected. Painting on any of the targeted 2D windows is automatically applied to that 3D element of the model in the 3D window. Painting on the model in the 3D window automatically updates the respective 2D painting. This reciprocal relationship between 2D and 3D is the heart of the MeshPaint process. The selection of default brushes includes star bursts, alternate painting nubs, star wheels, whirls, and other common and uncommon shapes. Paint can be applied by stroking the 2D or 3D canvas, or by simply clicking a shape down. All brushes are resizeable.

By double clicking on any brush in the visual library, an Image Brush dialog pops up. In it, the brush image can be altered by opacity and intensity sliders. Its type can be selected from the following list: Standard, Transition,

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Fade, TransFade, random Opacity, Continue Fade, and Random Color (current and all). The default brushes are not editable.

Two tools that are vital to 3D painting are the Polymap and Stamper functions. Polymap generates a 2D view of the object polygon by polygon, and can be saved as a file. This map is exquisite for painting a poly-by-poly texture that will map exactly to the object later. The Stamper is another tool that 3D artists will find a myriad of uses for, It allows you to cut out a defined rectangle in a 2D map (64 x 64 pixels maximum) and stamp the texture down on the 3D object. It can be used, for example, to add labels to products and graffiti to walls.

**Texture Mapping**  There has never been a way to add textures to 3D objects more intuitively than with MeshPaint. You can alter the selected 2D image during the mapping process by changing it as it is displayed on a 2D map, or by painting on it directly in 3D. Any 2D painting accomplished with MeshPaint's internal brushes on a 2D window instantly becomes a color texture map. Texture maps created in paint and photo manipulation software (Fractal **Painter** or **Photoshop**  for example) become instant texture map resources for 3D objects.

**Rendering**  A render button on the MeshPaint menu bar quickly renders the object as represented in the 3D window. Rendering has to occur each time that the object view is rotated or zoomed. The program is intelligent enough to write any changes painted on the texture in the 2D widows directly to the 3D object without re-rendering, unless you want to appreciate how it looks

from another angle.

**Saving the New Painted Object** Painted and photorealistic textures are saved as part of the object, and can be displayed and animated in the appropriate 3D software. With MeshPaint, textures can be adjusted directly to their 3D surfaces in near real time, with no more expensive and time consuming gaps between texture generation and 3D object renderings.

# Message Boxes

Message boxes are a way for the Macintosh to communicate with the user. If there's a problem `printing` a document, if your computer freezes up, or if you try to do something you're not supposed to do, you are met with a message or alert box. These boxes contain instructions, a statement, or a question and often have only one button you can select: the OK button.

*See Also*
Alert Box; Default Button; Freeze

# MetaTool's Convolver

*See*
Convolver

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## MFC
***See***
Microsoft Foundation Classes

## MFLOPS
MFLOPS, Millions of Floating Point Instructions Per Second, is a measure of CPU or FPU performance, depending upon whether the FPU is or is not integrated into the CPU.

## MFS
***See***
Macintosh Filing System

## Mice
***See***
Mouse

## Microcom Network Protocol

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# Microprocessors

Computers process data using a specialized integrated circuit called a *central processing unit* (CPU). The CPU, also called a *microprocessor*, has four main components:

- Registers. Registers are special areas within a chip that are used to store data and program instructions. There are several types of registers in the CPU. Some act as scratch pads where the computer can save the intermediate results of a computation or a series of items to be compared; other registers store the instruction or data that is currently being executed; and others keep track of where the computer is in the computation (for example which instruction is running). The Macintosh CPU has two types of registers: internal cache storage and Level-2, or external cache. The larger the cache the better the performance of the computer.

- Arithmetic and logic unit (ALU). The ALU performs the arithmetic and decision-making portions of computations for the CPU. The ALU operates to perform comparisons or mathematics.

- Instruction decoder. When a program's instruction is transferred from memory to the CPU's instruction cache, the instruction decoder

translates the instruction into machine language so that the chip can process the instruction.

- Internal address and data buses. These are the microprocessor's interconnections to the Mac's logic board's address and data buses.

The Macintosh CPU has been through a number of generations from its earliest 8 MHz 68000 microprocessor to the near-future's speedy 604e PowerPC microprocessor's 200 MHz. In between, Macs have moved from the **Complex Instruction Set Chip (CISC)** to the **Reduced Instruction Set Chip (RISC)** technology, as well as to much faster clock speeds and more complex integrated circuitry. The following table provides an overview of the various microprocessors used in Macs.

Macintosh Microprocessor Technologies

| Processor Model | Date Introduced - Clock Speed - Internal Cache - Bus Width - Mac Models |
| --- | --- |
| 68000 | 1984 - 8 to 16.67 MHz - none - 16-bit external bus and 32-bit internal bus - Classic, PowerBook 100, SE, Plus, 128K, 512K |
| 68020 | 1984 - up to 33 MHz - 256-byte instruction cache, optional 68851 PPMU - 32-bit LC and LC II, first generation Mac II |
| 68030 | 1987 - up to 33 MHz - built-in PPMU, 256-byte |

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| | |
|---|---|
| | instruction and data caches - 32-bit Mac SE/30, Classic II, Color Classic, IIsi, IIci, IIcx, IIx, LCIII, IIvx, LC520, Macintosh TV |
| 68040 | 1989 - 25 to 33 MHz - built-in PPMU, 4K data and instruction caches, subset of 6882 math coprocessor - 6-stage pipeline, 32-bit bus width - Performa 630 series, Centris/Quadra 605, 610, 650, Quadra 660AV, 840AV, 700, and 950, PowerBook 145, 170, 500 series, 190. |
| PPC 601 | 1994 - 60 to 100 MHz - 32K data and instruction caches, built-in single-precision FPU3 - independently pipelined instruction units for 8-stage pipelining, 64-bit - 6100/60, 7100, 8100, 7200 |
| PPC 603 | 1995 - 66 to 100 MHz - 32K data and instruction caches, built-in single-precision FPU, power management features for lower power consumption - 3 independently pipelined instruction units for 8-stage pipelining, 64-bit - Performa 6200 and 6300 series, PowerBook 5300, LC 5200 |
| PPC 604 | 1996 - 100 to 150 MHz - double-precision FPU, 256K data |

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and instruction caches dynamic branch prediction and speculative execution, 64-bit - 7500, 8500, 9500

***See Also***
680x0 Chips; Clock Rates; Processors, PowerPC Chips

# Microsoft Excel
***See***
Excel

# Microsoft Foundation Classes

Microsoft Foundation Classes (MFC) is a **C**++ application **framework** for creating programs that use Microsoft's **Win32 Application Programming Interface** .

Microsoft Foundation Classes (or MFC) is an extremely popular application framework in the Microsoft Windows programming world. The framework supports most of the common Windows functionality and makes it quick and easy to implement basic Windows programs.

Why would a Macintosh programmer care about MFC? Because you can actually write Mac programs using MFC. Microsoft's **Visual C**++ development environment includes a special Macintosh version of MFC. Programs written

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in MFC and compiled for the Mac use a Windows Portability Library to convert Win32 API calls to their Mac equivalents. This can result in applications that perform sluggishly and don't quite work the way a Mac program should, but for developers who want to port a Windows application (written using MFC) to the Mac, it can be a relatively painless solution.

***See Also***
Application Programming Interface; C++; Framework; Win32; Visual C++

# Microsoft Office

Microsoft Office is not to be confused with Microsoft Works. Both are considered integrated applications, although Office is also sometimes called a *suite*. What sets Microsoft Office apart from the Works programs is that it's strictly business. There's no draw or paint module, except the very limited one that's part of Word, and there's no telecom program. What you do get with Office are full, current versions of Microsoft Word, Excel, and PowerPoint, plus a single site license for Microsoft mail, and a mini-launcher for the three, called Office Manager. The program also includes five **OLE** servers, including Graph 5.0 for designing graphs, Equation 2.0 for building mathematical formulas, and an application called Organization Chart for creating common types of org charts. You also get a bargain. The Office package sells for a bit more than half the cost of purchasing the three programs separately.

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Office Manager places a small icon on your menu bar, which opens a menu like the one shown in the figure. Aside from giving you access to the three programs, it also opens the help systems. You also can put other frequently used files or applications on this menu. To do so, open the Customize… control panel. Select the items you want to put on the menu and click the button to add them. It's that easy.

One of the benefits of using Microsoft Office is that all three of the programs included have essentially the same interface. The Word toolbar looks and functions just like the Excel toolbar and the PowerPoint toolbar. After you've learned your way around any one of the applications, using the others is almost automatic. All three programs include Wizards that create documents for you based on information you provide. Office also comes with some additional help features built in. Office Cue Cards walk you through the steps in sharing information between applications. Quick Start guides you in opening and closing the applications from the menu bar, and cycling quickly through open applications. (Use ⌘+tab.)

Microsoft Office for Macintosh easily can share files cross-platform with Microsoft Office for Windows. Office also supports drag-and-drop sharing of data between its applications, so that you can create a series of charts in Excel, add them to text you've written and formatted in Word, and turn the whole package into a PowerPoint slide show with a few mouse clicks.

The applications come either on CD-ROM or 1.4 Mb floppies—a *lot* of floppies. (The CD-ROM apparently contains 34 disks.) The complete installation

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requires 68MB of hard disk space. To run all three applications you'll need 8MB of RAM plus whatever your System 7 configuration requires. And it will not run on any of the older Macs, up through the SE, Classic, or PowerBook 100 models. The CD-ROM version includes the manuals on CD-ROM, but no printed copies. There's an order form in the box, but if you must have them, you'll pay extra for them.

***See Also***
Excel; PowerPoint; Word; Works Programs

# Microsoft PowerPoint

***See***
PowerPoint

# Microsoft Windows Emulation

The Macintosh has the capability to run applications designed for the **Microsoft Windows** operating system for PCs, by using windows emulation software. This software enables you to open a separate window on the desktop and run an emulated version of Microsoft Windows and Windows-compatible applications. You can access a wide range of Windows software from your own Macintosh, without buying a separate computer. Another advantage is that you can **copy** and **paste** information and items between Windows

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applications and Macintosh applications. The drawback is that the software emulation runs the software at a slower speed than on a PC.

You can also run DOS and Windows applications from your Macintosh by using Apple's DOS Compatibility card that was designed for use in Macintosh 6100 and Performa 6100 series computers. This plug-in card contains an actual 486DX2 PC processor giving you a PC and a Macintosh computer in the same box. Apple offers this PC card already installed in the LC 640 DOS Compatible model.

There are also third-party PC plug-in cards for the Mac available from Orange Micro, which include their latest card that enables Mac users to run Microsoft Windows 95 on their Macs. Both the Apple DOS Compatible card and the Orange Micro cards offer operating speeds of Windows applications similar to that of a comparable PC computer. Another third-party PC-compatible card developer, Reply Corp., is offering PCI-based DOS cards for Apple's line of PCI-Macs.

Apple is reportedly rolling out their own series of PCI-based DOS cards which will feature one unit with a 100-MHz Cyrix 5x86 processor and a separate unit running a 100-MHz Pentium chip made by Intel Corporation.

***See Also***
Copy and Paste, Microsoft Windows

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# Microsoft Word, Customizing

Habits are hard to break. After you get used to a program like Microsoft Word, you can use it almost without thinking. Then, when a new version is released, which has more features than the old one, you find that they've moved all the old familiar stuff. You not only have to learn a new program, you have to unlearn the old one. The good news is that Word 6 lets you use a toolbar that has the familiar Word 5.1 buttons instead of the updated Word 6 version. You can even build your own toolbar, taking features from the existing ones, and putting the buttons where you want them. You can customize your menus and keyboard shortcuts, too.

To use the Word 5.1 toolbar, open the Toolbars dialog box from the View menu.

To customize toolbars, menus, or key commands, choose the Customize… command on the Tools menu. To change the toolbar, select the category of tool button to add. Click the buttons to see a description of what they do. Drag the button to the tool bar (as shown in the following figure) to put it there. To remove a button you don't use, click and drag it off the toolbar. To create a new toolbar, go to the toolbar box, click new, and then customize it as described previously.

To customize menus, use the Customize dialog box. Go to the menu section and use the scrolling list to add commands to the menus. To add key shortcuts, go to the keyboard section. Locate the action for which you want to create a key combination. Insert the cursor in the Press New Shortcut Key box and type

the key combination you want to use. If that combination already does something else, the box will tell you so. If not, click Assign or press Return. You can also reassign the existing command to the action you've chosen by selecting it from the Current box, clicking Remove, and then assigning it as described.

# MIDI

Originally developed as a method for connecting synthesizers (keyboards), MIDI quickly was adopted for connecting computers to musical instruments. MIDI is an string of data that contains information about what key was pressed, what time it was pressed, how hard it was pressed, as well as the **patch** (which is a small computer program that re-creates the sound of a musical instrument). It's an excellent way to record a performance, because the MIDI file is so small, unlike digitizing a sound, which requires a lot of bandwidth. Of course, the big difference is that MIDI files do not contain any musical sounds; the synthesizer provides that information. That also means that you need a **MIDI-capable keyboard or application** to play back the music.

One problem of the original MIDI specification is that while it contains the patch numbers used in the song, different keyboards use the same patch number for different instruments. Patch 3 can be a piano on one synthesizer, a guitar on another. This means that unexpected results (i.e. noise) could be heard if a MIDI file was played back on a different keyboard

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from the one on which it was created.

The development of **General MIDI** addressed this problem. General MIDI instruments assign specific sounds to specific patch ID numbers. This means that a MIDI file created using one General MIDI keyboard will play correctly on another.

Connecting a keyboard to a Macintosh requires a special MIDI cable which connects to the serial port of the Macintosh and the MIDI plug in the synthesizer.

**Sequencing** software runs on the computer, records, and then plays back MIDI files. Sequencing software usually requires a **MIDI keyboard** to be attached to the computer, but that is not always the case. Some sequencing software has been released with their own patches (sound files) that play back the MIDI file through the computer sound hardware. Obviously, there are limitations to the quality of the sound —specifically the quality of the patches, the quality of the sound hardware in the computer, and the speakers through which it is played.

Apple has developed some System software to help users work with MIDI files. The **MIDI Manager** is System software for handling communications between MIDI instruments and the computer. The MIDI Manager comes with three parts: the Apple MIDI Driver, Patch Bay, and MIDI Manager. While Apple intended MIDI Manager to help software developers, not all developers decided to use it; MIDI Manager was said to perform poorly compared to dedicated software.

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Apple recently added new support for MIDI within **QuickTime**. Apple licensed a collection of patches(synthesized instruments) from Roland and included them in the **QuickTime Musical Instruments** Extension. MIDI files can be opened within any application that opens QuickTime files, and the conversion process is very similar to converting a **CD audio** file to a QuickTime movie.

To convert MIDI to a **QuickTime** file choose Open, from an application, such as **MoviePlayer**, and select the MIDI file. If the MIDI file came from a non-Macintosh computer, you might have to change the **file type** to "Midi" using a program such as **ResEdit**. Then, the Open button changes to Convert. Choose Convert and the software asks you to name the new movie file. Click the Options button and you are presented with a list of the patches used in the MIDI file. You can click a patch and click the Instrument button to see a list of the synthesized sounds contained in the QuickTime Musical Instruments Extension. Note that all the General MIDI patches are listed, but not all of the patches are available (those that aren't available are italicized).

After setting up the conversion, click Close and convert the file to the QuickTime format. Note that the converted file still does not contain any actual audio information, and is only a couple of kilobytes larger than the original MIDI file. When the file is played, you must have the QuickTime Musical Instruments and QuickTime extensions installed. Also, the quality of the playback does not match that possible with a separate synthesizer.

MIDI is popular with musicians, but despite its small size and convenience,

has not proved popular with multimedia producers. This is mostly because of the requirements for special hardware to produce really good-quality sound. Macromedia actually removed support for playing MIDI files from **Director** when it upgraded it from 3.0 to 4.0 There is an Xtra for Director 5.0 available from Yamaha. This decision may have been prompted by the addition of MIDI support within QuickTime.

Web: http://www.midifarm.com/

*See Also*
QuickTime; Sequencing Software; Sound Digitizing

# MIDI Manager
*See*
MIDI

# MIDI Translator II
A cable for connecting a Macintosh to multiple MIDI devices. The cable attaches to the Macintosh serial or printer port, and includes one MIDI in and three MIDI out plugs. No power supply is required.

Opcode Systems
Fax: (415) 856-3332

# M

Phone: (415) 856-3333
Web: http://www.opcode.com

*See Also*
MIDI; sequencer

# Might & Magic: World of Xeen

Traditional **Role Playing Games (RPG)** for the Mac are few and far between. Recent additions to the line-up, like Curse of Dragor from Domark are a welcome site, but don't really push the technology far enough to please hard core RPG lovers. If you don't like playing in the online **MUDS**, the best game to check out is **Might & Magic**. Composed of two separate **DOS** titles, the **port** of Clouds of Xeen and Darkside of Xeen as World of Xeen is still the best Mac RPG around. In Might & Magic, you wander the land of Xeen, taking on quests and adventures depending on where you roam. Of course, along the way, you encounter more than a hundred assorted monsters that you must defeat in order to progress. In the tradition of Dungeons & Dragons style gaming, you choose your characters and parties in various inns.

As in most advanced RPG's, reading the manual carefully is necessary for figuring out which type of character is worth creating, but if you are a true D&D fan, you're probably used to all that technical paperwork and won't be bothered. If you're a beginning gamer who wants something easier to start with, you might want to try an easier title like **Dungeon Master II** first.

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Though Dungeon Master may be a little too basic for advanced players, it is still a good RPG. New Might & Magic titles are released several times a year.

***See Also***
Adventure Games; Curse of Dragor; Dungeon Master II; Role Playing Games

# Millie's Math House

This is one of several titles from Edmark's Early Learning House series. Targeted for very young children, ages 2-5, it teaches counting skills, pattern recognition, and some very basic geometry. The animated characters are cute but the constantly repeated instructions get annoying after the first few minutes. Some of the activities have several levels of skill.

The object of one exercise is to learn the names of the geometric shapes. Frank Lloyd Mouse will ask for the parts he needs to build things. The child must click the appropriate shape to place it on the board. Clicking the more complicated blue prints sets up more complex patterns for the child to fill in, with more kinds and sizes of blocks. Other activities include fitting shoes to critters with big, small, or medium feet, counting and adding objects with Dorothy Duck, and decorating cookies with the number of jelly beans requested by Harley Horse. The booklets that come with the programs include suggestions for "Together Time" activities for parent and child to share.

***See Also***
Educational Software, Pre-School

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# MIME Type

A standard way of identifying a file so **client** software can identify and process it. Often encountered on files downloaded from the **Internet** or **World Wide Web**.

*MIME* stands for *Multipurpose Internet Mail Extensions*. MIME is a standard on the Internet that allows the transmission of a wide variety of different kinds of files via **email**; it allows you to send not only text files, but sounds, images, and software, among other things.

When, behind the scenes, a client such as **Netscape Navigator** requests a file from a **Web server**, many servers include the file's MIME type as part of the package that contains the file. Netscape uses MIME to determine what to do with the file. If it's an **HTTP** page, text, or a **GIF** or **JPEG** file, Netscape handles the file. If not, Netscape attempts to pass the file to a **helper application.**

MIME types are divided into broad categories such as "image," "audio," "video," and "applications." There are differences between the files in a single MIME type. For example, the "application" type includes both PostScript files (essentially programs for controlling imaging equipment) and **StuffIt** files (**compressed** versions of files of any type). The only thing that PostScript and StuffIt files really have in common is their MIME type designation.

MIME types are further divided into *subtypes,* which categorize single,

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particular kinds of documents, like GIFs (a type of picture) or **AIFFs** (a type of sound). These subtypes are more practical: all GIFs are very similar in format, and a program that can read one file of a subtype can usually read all files of a subtype, although sometimes not very well. For example, Photoshop can open both GIF and GIF89 files, but Photoshop can't take advantage of the transparent pixels that distinguish GIF89s from garden variety GIFs.

Netscape, for instance, maintains a list of MIME types and specifications for how to process each one it encounters on the Internet. The following table lists settings a user can specify to control how Netscape uses MIME types.

Netscape MIME Types

| *Type* | *Purpose* |
| --- | --- |
| image/GIF | Signifies a file of type "image" and subtype "GIF." |
| Application | Indicates the application to which a particular MIME subtype is passed. |
| Action | Controls the relationship between Netscape and the helper application—whether the helper application runs independently of Netscape or uses the Netscape window to display the file. |
| Extensions | Is a backup system for categorizing files when the Web server doesn't provide a MIME type with a file. |

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A file named on a Web server with a given subtype's extension at the end of its name is treated as a member of the subtype; for example, Netscape knows that the file Picture.gif is an Image/GIF, even if the server did not designate the MIME type when the file was transferred.

***See Also***
AIFF; Client; Compressed Files; GIF;. Helper Application; HTTP; Internet; JPEG; MIDI; Netscape Navigator; StuffIt Expander; Web Browser; World Wide Web

# Mind Castle

Sub-titled "the Spell of the Word Wizard", this program plays like a game, but gives your vocabulary a pretty good workout in the process. You start on the top floor of the wizard's castle, earning clues to find the password that will let you go to the next level. Your goal, of course, is to escape before the wizard turns you into a frog. To earn the clue, you must choose the right words to complete sentences the wizard's assistant tests you with. Each correct sentence earns you a letter which either is part of the password or eliminates one that you might guess.

There are about 600 different words in the game. They are chosen at random, but your chances of seeing the same words increase drastically if you play more than once. There's no way to add more words, unfortunately. If there were, it would be an excellent skill-building program. As it is, the game is as much a race against time as a test of word definitions. Still, it's fun, and the

randomness helps give kids who might not be as proficient with words an equal chance to win.

***See Also***
Software, Educational, Adult; Software, Educational, Grades 7-12; Software, Educational, Pre-School; Software, Educational, K-6

# Mind Your Own Business
***See***
MYOB

# Mindy
***See***
Dylan

# MiniCAD
As one of the popular CAD options for professionals, GraphSoft's MiniCAD offers full-featured integrated industry solutions for CAD users. The Resource palette contains thousands of items in the Design and Drafting Toolkit (symbols, macros, parametric commands, database records, worksheets, and hatch patterns). New palettes and tools have replaced the commands of

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earlier MiniCAD versions, and extensive modifications have been made to the interface to enhance clarity and to further comply with industry standards.

**Dimensioning** Dimensioning is offered for constrained horizontal and vertical formats, constrained chains, constrained baseline, ordinates, centermark, diametrical/radial, angular, with the inclusion of upper/lower dimensioning limits where desired. The dimension standards are customizable as far as text positioning and alignment, tolerance sizing and text rotation. A full Dimension Info palette is available for editing all dimension information in the drawing, with support for the following dimensioning standards: Arch, ANSI, BSI, DIN, ISO, JIS, and SIA. Customized dimensioning standards can also be added by the user.

**3D Options** Clearly articulated commands in the 3D menu offer a list of the following sculpting, rendering and viewing options: Creating Linked Layers (a layers option as in Photoshop), Extrude/Multiple Extrude/Sweep (3D object creation tools), Conversion to Mesh or Polygonal objects, Move/Rotate the working plane, Cutting 2D/3D Sections, and rotating the 3D view. All standard orthogonal 3D views are supported and selectable, and exacting perspectives can be set. In addition to orthogonal and perspective projections, MiniCAD supports Oblique Cavalier 30 and 45 degree, and Oblique Cabinet 30 and 45 degree views (familair terms to CAD users). Rendering options include Wireframe, Quick, Solid, Shaded Solid, Shaded No-Lines, Final Shaded Solid, and Final Hidden Line.

**Text** MiniCAD follows all of the expected Mac standards for text insertion and

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font accessibility, and adds spacing and case commands. Text blocks on the page can be scaled and moved into position. MiniCAD scene files can also be exported as text files, and text scene files can be imported into MiniCAD. A special command translates any TrueType font into a polyline object (making the text object suitable for editing). This makes it easy to create full 3D text objects in MiniCAD. TrueType font files contain all of the necessary bezier curve data to make this translation possible.

**Symbol Library** MiniCAD allows the user to select from a list of possible overlay modes: Standard, AEC, Civil, Cross Stitch, Electrical, Mechanical, Terrain Modeler and Toolkit. Each of these modes has separate symbol libraries that provide symbol support, as for example the standard cross hatching techniques used to represent materials in that specific overlay.

**Import/Export** ClarisCAD users should note that MiniCAD offers complete translation capabilities from ClarisCAD documents. The Export formats supported include PICT, EPS, DXF, Text, QuickDraw 3D, Renderman, Worksheet, Data Base, and Quicktime Movie. The Import formats supported are PICT, PICT as picture (for tracing), EPSF, DXF, Text and Worksheet.

**Animation** MiniCAD has very powerful animation capabilities, allowing you to create path animations that function as virtual reality walk-throughs of any 3D model. The instructional CD guides you though each step of the process. The animations are user controlled as far as frame rate and keyframe settings, and complex camera interactions can be programmed.

**Rendering Options** MiniCAD has a list of preview rendering modes from

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wireframe and hidden line wireframes to solid, shaded, and final solid shaded options. The higher rendering modes require more RAM, so resetting the preferred memory size in the Info menu is highly recommended.

**Special Features** A complete Digital Terrain Modeler is included, allowing for the creation of DEMs (Digital Elevation maps) as either 2D contours or full 3D models from data files, 3D loci or polygons. The 3D model can be rendered as a solid and viewed at any angle. MiniCAD has a special menu dedicated to structuring and formatting tables. MiniCAD offers a special Multiple Extrude module that can aid in the production of objects very difficult to model by standard extrusion methods.

# Minidocks

*See*
PowerBook Duo Docks and MiniDocks

# Minor Software Release

A minor release will add a few new features and capabilities, as well as a bug-fix or two. Usually, the interface shows little change with this type of upgrade. Minor releases are generally inexpensive or free (give or take a handling charge) to registered users and are fairly safe in that they don't generally create new incompatibilities or exact new hardware costs.

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You can usually tell that an upgrade is minor if the version number increments in the second digit (or in the third, although that is often the indicator of a bug-fix update).

***See Also***
Bug-Fix Update; Major Software Release; Registration Card

# MIPS

MIPS, Millions of Instructions Per Second, is a measure of CPU speed.

# Mirror Site

A location on the **Internet** that mirrors or duplicates the contents of a very popular site, such as a Mac software archive.

Mirroring a heavily visited site more evenly distributes the site's contents to locations around the world. Overseas visitors thus have a server that can be accessed more quickly, because it is closer to them. Mirror sites also provide alternatives to users who cannot gain access to a busy site either because too many visitors are connecting to it already, or because the server is "down" or offline.

***See Also***
Anonymous FTP; FTP; Internet; Mac Software Archives; Web Server

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## Misregistration

***See***
Color Trapping

## Missing Application

***See***
Application Busy or Missing Message, Application Not Found Message

## Mister C

***See***
MrC

## Mixed-Mode CD

A **CD-ROM** that contains data of different formats. Usually this means combined CD-ROM data and audio tracks. Unfortunately, the data is stored in track one of the CD, and many audio CD players will read the first track and attempt to play it as "music," which results in a very loud and piercing noise. Some players detect the data track and will skip it.

**CD-Plus** was developed as a solution to this problem. It uses the multisession

format to place the audio on the first writing, and then place the data in a second session.

*See Also*
CD-Plus; CD-ROM

# Mixed Mode Manager

With the development of the Power Macintosh, Apple had a difficult choice to make. They could implement an entirely native operating system with a new model of program behavior (a time-consuming and compatibility-ruining proposition) or implement only the most time-critical portions of the OS in native code, and leave the rest in 68K code to be ported later. This second option has the tremendous advantages of speed and compatibility, and as a result, was the path Apple chose.

But with part of the **Toolbox** in native PowerPC code and part in 68K code, there had to be a way to integrate the two; there had to be a way for PowerPC code to call a snippet of 68K code and have the **emulator** step in and run that code without any further intervention from the programmer. Apple accomplished this using a new part of the Toolbox called the Mixed Mode Manager.

The Mixed Mode Manager puts no burden on non-native (68K) programs. If a 68K program running on a Power Mac calls a routine written in native PowerPC code, the Mixed Mode Manager automatically adjusts. Native

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applications, on the other hand, have to take on a little extra burden when they call routines that could be either native or not. Native applications do this by creating *Universal Proc Pointers* (UPPs) for these routines. A UPP is a special kind of **pointer** that identifies which instruction set the routine uses (68K or PowerPC) and contains information about the routine's parameters and return value.

UPPs are only required when native code calls a routine that may or may not be native. They are not needed when PowerPC code calls another PowerPC routine, nor are they required when calling Toolbox routines. The Mixed Mode Manager is fully documented in the "Power PC System Software" volume of **Inside Macintosh**.

*See Also*
Emulator; Inside Macintosh; Pointer; Toolbox

# MNP
*See*
Modem Protocols/Data Compression, Modem Protocols/Error Correction, Modem Standards and Speeds

# MOD
A musical file format originally developed for the Amiga, MOD can be

thought of as a cross between a **MIDI** file and a **digitized sound** file. Whereas a MIDI file contains only information about how a sound is created (but requires separate MIDI synthesizer software or hardware to create the sound) and a digitized sound file is a sampling of sound every few seconds, a MOD file contains both the musical information and instrument information.

MOD files are small and provide high quality stereo playback. Special software, however, is required to play a MOD file, and with MIDI file playback now available in the Macintosh operating system (along with a large number of programs for creating and editing MIDI files), MOD will probably not gain wide acceptance.

***See Also***
Audio XCMDs; MIDI

# Modeling

The process of creating **3D** objects. The modeling features provided by 3D programs differ widely, but some of the most common include lathing, sweeping, extruding, and free-form modeling.

There are three common ways to create 3D objects: lathe, extrude, and free-form. In lathing, a two-dimensional shape, called a cross-section, is drawn and then the 3D shape is created by rotating that shape around an imaginary center axis.

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A variation on lathing is sweeping, which is essentially lathing but with the capability to change the cross-section or the location of the cross-section during the rotation. Use sweeping to create complex objects, such as the tubing of a French horn.

Extrusion takes a two-dimensional shape and pushes it out along the third dimension to create the 3D shape. Extruding a circle creates a cylinder, extruding a square creates a cube. Lofting is a variation on extrusion in which the cross-section is varied as it is extruded.

While extrusion and lathing are very easy and understandable methods for creating basic shapes, there are still many shapes that cannot be created using such tools. Creating a human face (perhaps one of the most difficult modeling tasks) would be impossible using either extrusion of lathing. That's why most sophisticated modeling programs offer some kind of free-form modeler. In theory, a free-form modeler enables you to create an object of almost any shape. In **Marshall Hash's Animation** , shapes are created by drawing control points that define patches, which are the surfaces of the object. The shape of the surface is further defined by the shape of the lines that run between the control points. By moving the position of the control points and adjusting the shapes of the curves, you can create very complex shapes.

Unfortunately, most free-form modelers are difficult to learn and use. The problems of working with a three-dimensional shape on a two-dimensional display are most apparent when working with free-form modelers.

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Another important difference between free-form modelers is how they handle curves. Polygonal modelers use straight lines between control points—to create curves, the line is divided up into even shorter segments that approximate the curve. More sophisticated modelers support curved lines called **splines** (also sometimes called **Bézier** curves.) These are curved lines, and not only produce better-looking models, but are easier to manipulate than polygons.

Objects rarely consist of a single 3D shape. Usually, several shapes are combined to create complex models. **Boolean** operations take two objects and use one to cut into the other, creating a negative space in the remaining object. This makes it easy to create objects that would be hard to create using other modeling tools—for example, a hole in a ball. Strata's Vision 3D is one of the few low-cost (under $1,000) tools that supports Boolean operations.

For creating non-animated scenes, you often want to connect only one object to another in relative space, so that if you move one part, the other follows. But if you are creating animated objects—a walking figure, for example—then much more complicated connections are needed. Not only do you need to define the point at which one object connects to another, but you also have to define the movement of one object relative to another—this may be around an axis of rotation (for example a knee joint) or in along an axis (for example, a piston in an engine). Ideally, you should be able to define the movement as well as the limitations of the movement. Just how far can the knee joint bend?

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Often, the relationship between objects is defined as a parent and child relationship. The child object is connected to the parent and moves when the parent moves.

A more sophisticated relationship is called *inverse kinematics*, which is available in Fractal Design's Ray Dream Studio and Hash's **Animation Master**. Inverse kinematics causes a parent object to follow when you drag or move a child object. This is very useful for animating characters. By moving a hand, for example, the wrist and arm also move to reflect the movement of the hand.

*See Also*
3D; AddDepth; Animation; Animation Master; Electric Image; Extreme 3D; Infini-D; LogoMotion; Ray Dream Designer; Rendering; StrataVision; StudioPro

# Modems

The addition of a modem to your computer system opens the door to virtually unlimited information resources. By connecting your computer to an online service, such as **America Online** , or even to the Internet, a modem gives you access to news, airline schedules, magazines, your office **email** system, and even matchmaking databases.

The explosive growth of personal computers and of the growth of the Internet over the last several years is due in part to the high speed, yet

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inexpensive communications, that modems allow.

**Modems and Telecommunications Adapters**  Telecommunications connects people over long distances. The base of the word comes from the Greek word *tele*, meaning *far off*. Telecommunications began with the invention of the telegraph and the telephone in the 19th century, and continued with television and faxes in this century. With the advance of computer technology, modems and digital communications devices are the successors to the telegraph of the old west.

The modem is the most common telecommunications device used by computers. Modems use ordinary **analog telephone lines**  to communicate with other computers anywhere in the world. Computers began to use modems several decades ago, when terminals and mainframes communicated with each other at 300 bits per second. When the personal computer came along, people continued using modems for similar purposes, to access mainframes and other personal computers with terminal emulation software.

Since then, computer telecommunications has matured into a multi-faceted technology enabler. The marriage of the telephone and the computer enables your Mac to access the **Internet** and **online  services** , send faxes, and dial into **AppleTalk**  networks remotely. You can set up your Mac to answer your phone and provide voice mail. Your Mac can also dial the telephone for you, and you can use your Mac as a speaker phone. The use of computers with telecommunications in these ways is called *telephony*, and is one of the fastest growing areas of personal computer technology today.

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The term *modem* is short for MODulator/DEModulator. A modem converts the computer's digital signals into analog signals that are transmitted over the telephone line. You can hear some of these analog signals as squawking when a modem makes a connection. Most modems are usually hardware devices: little boxes that sit on your desk, **expansion cards** that sit inside your Mac, or credit-card-sized PC Cards for the recent **PowerBook** models. One exception is Apple's **Express Modem**, a purely software modem that uses the processing power of the Mac itself to perform the modulation and demodulation of signals. The Express Modem connects to a telephone line using Apple's **GeoPort** Telecom Adapter. The advantage of using software is that it has enabled innovative telephony software to be developed for the Mac at a lower cost than hardware solutions.

The manner in which analog signals represent data is specified by international modem standards. New standards every few years have been able to double the speed at which modems send data. The current standard, V.34, sends data at 28,800 bits per second.

However, modem technology is near the end of the line, and modem speeds will not double again. This is because V.34 has nearly reached the physical limit of analog signals being transmitted over the telephone lines. In fact, many call V.34 the final modem specification. This is at a time when data-intensive uses of modems, such as the World Wide Web, are increasing in popularity and in data transmission requirements. Modems can get effective throughputs that are up to four times faster than 28,800 bps using compression techniques, which means a file you're downloading will get to

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you four times faster. However, the modem still only sends a maximum of 28,800 bits over the line every second.

The solution seems to be to abandon the modem and the telephone lines in favor of transmitting information digitally. A modem must convert signals to analog form because ordinary telephone lines and telephone company switches are not equipped to handled digital data. However, most telephone companies now offer a new type of digital telephone line called **ISDN** (short for Integrated Systems Digital Network). Telephone companies have been busy for the past ten years installing ISDN switches in their networks and now have a great deal of the United States covered. Because ISDN is digital, it is many times faster than analog modem connections could ever be. Like a telephone line, ISDN can also carry voice, but the voice signals are digitized before being sent over the wire.

Modems are not used for ISDN, but you still need one of several types of telecommunications adapters for ISDN. Some are external boxes, and some are add-in cards. Sometimes such a device is called a digital modem or an ISDN modem. Technically, both terms are oxymorons, as there is no modulation or demodulation in digital communications.

Strictly speaking, telecommunications can take place without modems by making use of non-analog telephone lines, such as ISDN. However, since by far the most common form of telecommunication is via modem, we'll use the terms interchangeably here. (See **ISDN** for an explanation of its differences from standard modem technology).

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**Modems, Basic Functioning**  The basic purpose of a modem is to serve as a translator between your computer's digital transmissions and the analog transmissions possible over standard telephone lines (also known as POTS—plain old telephone service.)

The term modem is derived from this two step process: Modulation of computer signals into analog data for transmission into the public telephone system, and Demodulation at the remote end of the analog data back into digital signals for input into a computer.

Commands for the modem such as configuration and dialing are issued by your computer in the form of AT Commands. Data transmission between your modem and the remote modem are accomplished through various modem protocols.

**Modems, History**  The first modems used a brute-force approach to connecting computers and the telephone. The modem contained 'cups' into which the user would insert a standard telephone. To use this type of modem, one would configure the computer to receive data, dial a telephone number manually, wait for the screech of the answering computer, then insert the telephone headset into the modem's cups. (Interestingly, this is type is quite visual and is still shown frequently in movies and on television in otherwise "state of the art" computer centers).

Because these modems depend upon the telephone's normal headset for communications, their ability to transmit data is impaired and the likelihood of picking up background noise is quite high. Therefore, this type of modem

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was limited in the quality and speed of connection.

The next major step in the evolution of modems was direct connect modems. These modems plug directly into your telephone line, allowing you to be free of room noise and allowing the modem to dial for you. Direct connect modems attach directly to telephone lines via the wall jack.

As technology improved, modems (as with most products that are technology based) were able to provide faster communication at lower prices. Although today's modems seem incredibly fast by the standards of five years ago, the same will no doubt be true in another few years.

**Modems, What to Look For**   Like other peripherals, modems are judged by speed, features, and price. It used to be that the faster the modem speed, the more it would cost. Today, you pay more for additional features, not speed. This is because the cost of the fastest modems, the V.34 modems that operate at 28.8Kbps, has dropped to the same price as modems running at slower speeds. At this point, there is no point in getting anything slower than a V.34 modem. (In the future, it will even be hard to find anything slower than 28.8 modems.)

Among V.34 modems, however, the actual speed that the modem operates at can vary between manufactures slightly. In addition, some modems are more troublesome than others, and some handle poor line conditions better than others. Some modems have trouble communicating with other modems of certain brands.

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These speed and reliability issues are difficult to get a handle on. Computer magazines that test modems in depth are a good source of information. If you've used a modem before, there's no need to limit yourself to Mac magazines—a PC magazine will work just as well, since modems are fairly cross platform devices, and many manufacturers package their modems for both Mac and PC users. Keep in mind that internal PC modems (modems on expansions cards) will not work in Macs. It is convenient if the modem comes with a Mac **modem cable** and manual geared towards Mac users, but this is not essential. You can always buy a cable separately, and most modem users never open the manual. What you do need, however, is a Mac driver for your modem. Many telecom programs such as Zterm, America Online, and CompuServe provide drivers for a long list of modems. If you're buying one that's meant for a PC, at least check to be sure that it has a Mac-compatible driver.

The problem is that most computer magazines, Mac and PC, don't review modems very often. Getting to the bottom of modem reliability speed issues is a tricky business, one which magazine editors are not fond of. If you already have a modem, you can find information about modems in discussion groups on the Internet and on online services such as America Online and CompuServe. Here you will find word-of-mouth information on problematic modems and those that users find trouble-free.

**Modem Features** Like any piece of computer hardware, modems come with a variety of features. A feature that is essential to some people can be a waste of money to other people and can even get in the way.

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The modem feature that gets the most use today is **fax** (facsimile). These days, the fax ability adds little or no additional cost to a modem. Some fax/modems can both send and receive faxes — to and from any fax source, whether it is another fax modem or a traditional paper fax machine. However some fax/modems only send faxes, and can't receive them.

Fax modems are usually bundled with software for your Mac. The software can vary greatly in ease of use, and is often what differentiates one fax modem from another. If the fax modem is marketed to PC users, it will come with software for Windows but not for Mac. However, you can buy fax modem software from a variety of companies. There is even shareware fax modem software. If you don't like the fax software that came with your modem, you can run one of these other programs instead.

Some modes also have the ability to carry voice as well as faxes. These are sometimes referred to as **voice/data/fax modems**. With voice modems, you can set up a voice mail system on your Mac and have it answer your phone. Voice capability comes at a premium, so make sure you need it before you pay for it.

A good feature that everyone can use is a **flash ROM**, which provides easy upgradability. Modems with flash ROM can be upgraded with newer software, such as newer versions of the V.34 modem standard. Some modems can be upgraded to **ISDN** via flash ROM, a good feature if you think you might move beyond the speed limitations of an analog dial-up link.

To some, a modem is not a modem unless it has blinking status lights on the

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front panel. Status lights can be useful for troubleshooting problems, but few people use them on a day-to-day basis, and it does cost money for a manufacturer to add them. Some modems take status lights to the extreme and include small LCD displays on the face of the modem.

Along with the blinking lights comes the squawking of the modem as it makes a connection. Some modems are noisier than others. While some users feel the modem dialup tones are reassuring and helpful for troubleshooting, others find the loud squawking of modems disruptive, especially in an office. Some modems squawk very quietly or not at all. Often you can set the volume of a modem using AT commands you type from a terminal emulation program such as the shareware application ZTerm, or commercial packages such as MicroPhone, SITcomm, or Smartcom.

Modems that are **Hayes compatible** use the full AT command set, a group of common modem commands used between the computer and modem for dialing, making the connection, hanging up, and other modem activities. Some manuals give you a list of these commands, so you can manually operate the modem or access special functions by typing in the commands in a terminal emulation program. However, use of AT commands falls clearly into the power user or techno-hobbiest category, and is not something many people find they need.

**Modems, Notable Mac Friendly** Modems are relatively cross-platform devices. They use the same commands on Macs and PCs, contain the exact same hardware in the Mac and PC versions. There is no reason why you can't

buy a PC fax modem and then buy third-party fax software to run on your Mac.

However, if you want everything you need in one package, you'll want a Mac-friendly modem bundle. You usually get a Mac cable and fax software that runs on a Mac. You'll also get the necessary CCL file required to work with **Apple Remote Access** , something a PC modem vendor may not have. You'll also get access to tech support people who are familiar with the Mac.

The modems listed here are all V.34 (28.8Kpbs) modems, and most have fax capabilities. They vary in features and in price, but all are from companies that offer Mac-specific bundles.

**AT&T/Paradyne SComsphere** This industrial-strength modem has an industrial price as well, but owners of Apple Remote Access servers and bulletin boards (BBS) will appreciate the AT&T Paradyne Comsphere 3810Plus for its ability to run continuously (without attendance). It has a reputation for going and going, and has received good scores for reliability and speed in several reviews. The Comsphere 3810Plus has industrial-strength features as well, including firmware that can be upgraded automatically and the ability to be managed over a network. It also includes an alphanumeric display, a row of 13 status indicators, and a watchdog timer, an internal device that detects line problems and automatically resets the modem. This latter feature prevents you from manually having to reset the modem if a connection fails, an important feature for a modem connected to a server. This is the one modem listed here that does not have fax capabilities. Be sure to ask for the

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Mac version. AT&T/Paradyne, 800-482-3333, 813-530-2000

**Global Village OneWorld Combo**   In a box no bigger than a desktop modem, the Global Village OneWorld Combo is a modem server containing one or two modems that can be shared by users on a network. It lets anyone on an **Ethernet** or **LocalTalk** network dial out via the one or two Global Village Platinum v.34 modems inside the unit. It also offers send and receive fax, and functions as an Apple Remote Access (ARA) server. With the Apple Remote Access client software installed on a remote Mac, you can dial into the OneWorld Combo sever and access the network.

The OneWorld comes with the same fax software as Global Village's stand alone modems, and is one of the best fax programs you can find. The only potential hassle is that received faxes arrive at only one Mac, or can be automatically printed to a printer. The OneWorld Combo is still a good value for a small office or work group, and gives speedy, trouble-free connections at a good price.

Global Village makes popular modems for desktop Macs, the TelePort line, and PowerBooks, the PowerPort line. The company also make modems in PC Cards for PowerBooks with PCMCIA slots. The V.34 version in each line is called the Platinum. Global Village Communications 800-436-5591.

**Practical Peripherals MacClass 288MT II V.34**   The MacClass 288MT II V.34 is an inexpensive model suitable for desktops. It has been shown in reviews to make fast, clean connections, and comes from a long line of solid Mac modems. It also handles changing or deteriorating line conditions well.

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However, the MacClassMT II V.34 lacks a flash ROM, so it can't accept software upgrades. Still, the company has confidence in this modem, as it offers a lifetime warranty. Practical Peripherals 805-497-4774

**Supra SupraFaxModem**   The SupraFaxModem is a popular and inexpensive modem that features small size and an option to upgrade to voice capability. This modem offers good performance with few problems. (Earlier Supra modems has some problems connecting to certain brands of modems, but this V.34 version seems to have been cured of the previous maladies.) However, upgrades are easy with this modem because it contains a flash ROM which lets you install upgrades by downloading software. The SupraFaxModem also features an alphanumeric LED display, as well as four status indicator lights. Supra has been doing modems for Macs for many years and knows what Mac users expect. Supra 800-727-8772, 360-905-1410.

**U.S. Robotics Courier V.Everything with V.34**   A long model name from one of the major manufacturers of modem chips. (U.S. Robotics chips are used in Supra modems, among others.) This another modem with good, trouble-free performance, and it contains both fax and voice capabilities.

The V.Everything is a business modem that is priced higher than some of the others, but also has some industrial-strength features. It can be left on all the time without attendance, as when connected to an Apple Remote Access server or a bulletin board (BBS) server. This means that it doesn't have to be manually reset. It has 12 status indicator lights, and it's also available in a rack-mountable case. However, it does not have any network management

features.

While most modems enable you turn down the volume of the squawking tones with software or with primitive AT commands, the Courier V.Everything is one of the few modems with a volume control knob on the case. U.S. Robotics 800-877-2677, 708-982-5010.

**Modem, Connecting to the Telephone Line**     Your modem connects to the phone line using a standard RJ-11 modular phone cable, much as you would connect any answering machine or fax machine. However, it's very important to note that there are actually two types of telephone systems that use the same RJ-11 Jack: Analog and Digital. Analog telephone systems are the types normally used in homes, or very small (one or two line) offices. Modems, Fax Machines, and standard telephones all require the analog system. Analog is also called (especially by phone company service people) POTS, for Plain Old Telephone Service.

Digital telephones (also referred to as keysets) require an entirely different type of signal to be transmitted through this jack. Digital telephones are the type normally used in businesses, which support multiple telephone lines (greater than 2) as well as advanced features such as transfer, conference and digital displays. ISDN phone service is also beginning to be offered in some parts of the country. It's used primarily for large volume data transmission and for very high-quality broadcast transmission of voice and picture. It, too, is digital and requires a special type of digital modem for data handling. These routinely carry data at 57,000 bps, making graphics on the

Web actually fun to watch.

If you're not sure which type of telephone jack you have, make sure to ask the person who is in charge of your telephones. Do NOT simply plug in your modem to see what type of jack it is — the electrical current in digital jacks can ruin both your modem and computer it is attached to.

> TIP Several companies make digital to analog converters to allow you to hook up a modem to a digital phone line by a connection through the digital telephone. Results with these units vary greatly depending upon the telephone system in use and with the modem type, so ask co-workers for advice before investing.

**Modems, Connecting to Your Macintosh**    The way the modem connects to your Macintosh is determined by the Mac model and type of modem. All Macs have serial ports (labeled Modem, Printer, or Modem/Printer depending upon the Macintosh model.) Most external modems (see modems, types) connect to the Macintosh through a serial cable which connects to these ports. A few, notably some Global Village and SpectraCom Pocket modems, connect through the ADB port. In addition to the external port(s), the PowerBooks and certain Performa models also have a dedicated slot for an internal modem (see modem, types). Whether internal or external, the Macintosh communicates with the modem using Asynchronous communication.

Today's high-speed external modems require a Hardware Handshaking cable for connection to your Macintosh (see handshaking). This cable will have a

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standard Mac Mini-DIN 8 plug on one end, and a DB-25 connector at the other end. If your modem didn't come with a Mac cable, check with your local computer store or any of the big Mac mail-order houses to order one.

All modem cables are not created equal! To allow your modem and cable to function effectively, you will need what is known as a hardware handshaking modem cable. This cable provides for signals to be sent between the modem and the computer to keep everyone in synch. If the cable provided with your modem doesn't support hardware handshaking (it should specify), get one that does. This will save you lots of hours of frustration!

***See Also***
Analog Telephone Line; Digital Telephone Line; GeoPort; ISDN Terminal Adapters; Modem Cables and Connections; Modems, Notable Mac Friendly; Modem Standards and Speeds; Modems, Types; Modem, What to look for; Express Modem

# Modem Cables and Connections

The cables that connect the modem to a telephone wall jack are the same cables used to connect a telephone to a telephone wall jack. At each end of the cable is the RJ-11 connector, the same as used in telephones. Most modems have two RJ-11 connectors—one to connect to the wall jack, and another, a pass-through connector, in to which you can plug a telephone for voice communications. The pass-through connector allows you to share the

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phone line for both voice and data transmissions, but not simultaneously.

To connect the modem to a Mac, you need a cable that plugs into the round serial ports, the Modem Port or the Printer Port. Power Macs and the old Quadra AV Macs have serial ports with 9 pins. This indicates that they are GeoPort-enabled. Apple's **GeoPort** Telecom adapter can plug into these serial ports, but non-GeoPort modem cables also work connected to these ports. The serial ports of other Macs have 8 pins.

Modems that operate at 9600 bps and faster require a hardware handshaking cable to connect to a Mac. If you are replacing an old 2400 bps modem with a modern modem, you'll need a new cable. Most new modems come with a hardware handshaking cable. Unfortunately, you can't tell if a cable supports hardware handshaking by looking at it.

Hardware handshaking is the method that faster modems use to regulate the flow of data between the modem and the Mac to which they are connected. For instance, if the Mac is sending data to a modem faster than the modem can transmit it, the modem will tell the Mac to pause. Hardware handshaking modems use commands called Request to Send/Clear to Send (RTS/CTS), which are sometimes indicated on modems and in communications software. RTS/CTS are called *flow control* commands, used to tell the modem and the computer it is connected to when to send data and when to stop sending data. RTS/CTS is referred to as hardware handshaking because the modems contain circuitry that generate these commands, and the cable contains a special signal line. A change in voltage on this line is used indicate the RTS or CTS state.

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Non-hardware handshaking cables don't have this special line. Older modems use a flow control called Xon/Xoff, which is sometimes called software handshaking, because there is no special hardware associated with it. Instead, a command code is sent over the data lines in the cable. Software handshaking is slower than hardware handshaking, which is why the former was replaced by the latter in higher-speed modems.

There is another type of serial cable called a null modem cable, which doesn't connect a modem at all. A null modem cable connects a Mac directly to a PC using the serial ports of both machines. It has a round eight-pin connector on the Mac side and a 15-pin (two rows of 8 and 7 pins) connector on the PC side. You can use either the Mac's printer port or modem port, but you'll have to turn AppleTalk off in the Chooser if you use the printer port. Using a null modem cable and terminal emulation software, such as the shareware ZTerm on the Mac, you can transfer files between the Mac and PC without the use of modems. The communications settings on the terminal emulation software on both machines needs to be the same in order for a file transfer work.

### *See Also*
Analog Telephone Line; GeoPort; ISDN Terminal Adapters; Modem Cables and Connections; Modems, Notable Mac Friendly; Modem Speeds and Definitions; Modem, What To Look For; Modems and Telecommunications Adapters; Express Modem

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## Modem Commands
*See*
Hayes AT Command Set

## Modem Pool
*See*
Server/Modem

## Modem Port
*See*
Serial Port

## Modem/Printer Port
*See*
Serial Port

## Modem Server
*See*

Server/Modem

# Modem Standards and Speeds

International modem standards are set by a group known as the International Telecommunications Union—Telecommunications Standards Sector (ITU-TSS), formerly know as the CCITT (Consultative Committee for International Telegraph and Telephone). This group sets the standards that makers of modem chip sets follow, which enables modems from different manufacturers to communicate with each other.

The standards determine how many bits per second the modem will transmit, as well as methods of data compression and error checking. Each standard can communicate at all the previous slower speeds, which means they can communicate with older modems that don't support the same specification. Modems also can jump down to a slower speed if a telephone line is noisy and can't support communications at the higher speed.

The standards are named with a V and a dot, followed by a two-digit number. They are sometimes followed by "bis," which is French for "second." The table that follows starts with the most current standard and works backwards.

Table of Modem Standards

| Standard | Purpose |
| --- | --- |
| **V.34** | 28.8Kbps communications |

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| | |
|---|---|
| **V.FC, V.FastClass** | 28.8Kbps communications, an interim standard |
| **V.32terbo** | 19.2Kbps communications |
| **V.42bis** | compression |
| **V.42** | error correction |
| **V.32bis** | 14,400Bps communications |
| **V.32** | 9600Bps communications |
| **V.22bis** | 2400Bps communications |

The V.34 standard may be the final modem specification, as it pushes data over standard telephone lines near the maximum limits that physics allows. The V.34 specification may be improved slightly, but modem connections can't get faster than 38.4Kbps, the phone system's theoretical upper limit for analog signals. Even if V.34 is improved, the changes to the specification will be so minor that the spec won't be renamed "V.34bis."

Before V.34 was finalized, several modem manufactures used an unofficial interim standard called V.FastClass, or V.FC. Most V.FC manufactures offered upgrades to V.34 when it came out. Although V.FC and V.34 are both 28.8Kbps standards, the latter has several enhancements over V.FC, including a probing tone that continually monitors and acts upon changing line conditions.

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V.32terbo was used only for a short time and was never very popular. It has the spelling "terbo" instead of "turbo" because "ter" is French for "third," indicating that this was the third V.32 specification.

The V.42bis compression standard increases the actual throughput by compressing the data before sending it. The V.42bis modem on the receiving end recognizes that the data is in compressed form, and decompresses it before sending it to the computer it is plugged into, The compression in most modems can increase throughput by a factor of three or four times.

The CCITT standards incorporate server other specifications called **MNP**, for **Microcom Network Protocol** , developed by the company of the same name. For instance, V.42 incorporates MNP 2, 3, and 4 error corrections. Many modems also support MNP specifications that are not included in the CCITT standards, such as MNP 5 compression and MNP 10 error correction used in cellular communications.

***See Also***
Data Communications Standards; Modems and Telecommunications Adapters

# Modem Transfer Protocols

Sets of standard rules that computers use in order to accurately transfer files while connected by modem to bulletin board services. An important step that needs to be performed before downloading software from a network.

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Modem file transfer protocols are not the same as anonymous FTP, a protocol used to transfer files on the Internet.

It is essential that you choose a file transfer protocol that matches the protocol used by the computer serving or transmitting data to you.

The following table lists some of the more common protocols.

Modem Protocols

| *Name of Protocol* | *Description* |
| --- | --- |
| Kermit | Older file transfer format used to communicate with UNIX systems, now seldom used. |
| XMODEM | Widely supported but relatively slow file transport protocal that transfers files in blocks 128K in size. |
| XMODEM-CRC | A variety of XMODEM that uses the cyclic redundancy check error-checking method. |
| YMODEM | Lets you send a batch of files with one command, uses CRC error-checking. |
| YMODEM-G | Faster variety of YMODEM that does not perform error correction, for modems already containing error-correction hardware. |
| ZMODEM | Very fast, reliable protocol; file transfers can be resumed following an interruption. Recommended. |

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# Modems, Types

Modems are small devices which can be located either inside or outside of your computer. The word modem comes from modulate/demodulate, which succinctly describes their function. The task of the modem is to modulate the outgoing digital signal from your computer into an analog signal which can be transmitted over a normal telephone line, and to demodulate the incoming analog signal from another computer/modem into a digital signal which your computer can understand.

Aside from their physical location (internal or external), the key differences between modems are how fast they communicate, the software which runs them, and how they connect to your computer.

**External Modems** An external modem is a piece of hardware that sits outside your Mac as an self-contained unit. Most are about the size of a portable CD-ROM player, though they come in literally all sizes and shapes from a plug-in PCMCIA card about the size of a single playing card to a box big enough to hold a hard drive. Most of these devices connect to your Mac through the serial port (either the modem, printer, or printer/modem port, depending upon the model in question.) PCMCIA modems, obviously plug into

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the appropriate slot on a PowerBook or other Mac equipped to handle them.

In an interesting repetition of history, "acoustic" external modems of are now becoming available again. Rather than plugging directly into a RJR-11 telephone jack, these types of modems connect by physically placing the modem into, or next to, the small "talk" and "listen" cups of the telephone.

Some have a pair of rubber cups that attach to the telephone handset. Others have a sort of cradle into which you place the handset. These modems are becoming popular again because of the increasing dependency people have on staying in-touch electronically. People who travel frequently can end up situations where they need to connect to the office to check for mail or transfer files, but they can't find an RJ-11 jack to connect their modem. In these situations, an acoustic modem and a payphone can be a quick fix.

Internal Modems Internal modems fit entirely inside the case of the computer. Although this type of modem is very popular in the DOS/Windows world, on the Macintosh side only PowerBooks and certain Performa Models support internal modems. The principle advantage of this type of modem is space savings.

You eliminate a piece of desktop clutter, or in the case of the PowerBook, you avoid the need to carry an extra piece of gear. The only visible indication that an internal modem is present is a telephone jack on the back of the box. The main drawback of this type of unit is that you don't see the status lights showing you when the phone is off the hook or the transmission status of data. (Certain modems, such as the Global Village PowerPort products, provide

this through software indicators on the Mac's Screen). An additional drawback is that it's very difficult to share an internal modem between two or more computers. External modems can easily be unplugged from one Mac and plugged into another.

The Apple Express Modem is made for certain PowerBook and Duo models. It runs partially in software, and so reduces the amount of RAM available for other tasks by about 300K. It supports connections up to 14.4 kbps, and handles faxing as well as modem tasks.

Although most PowerBook modems come with instructions on how to install the modem yourself, opening your PowerBook's case voids your warranty and puts your PowerBook in jeopardy. If you're at all uneasy about the process, it makes sense to let an Apple Dealer do it for you. The cost of installation pales when compared to the anxiety and repair bill caused by a broken PowerBook.

*See Also*
Modems

# Moderated Newsgroup

A **Usenet newsgroup** moderated by an administrator who judges the appropriateness of an article before allowing it to be posted to the group at large.

Most newsgroups are unmoderated: anyone who wants to can post anything,

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even if it is irrelevant to the topic. Most moderators are overworked volunteers and charges of censorship can arise because the moderator may not always represent the views of the majority of the readers. Moderated groups tend to have less traffic and the messages that go through are more likely to have some worth. You can ask why a posting was rejected by a moderator so that future submissions have a better chance of reaching the rest of the group.

***See Also***
News Article; News Server; Newsgroup; Thread; Usenet, Posting to

# Modula-2
***See***
Pascal

# Moiré

Moiré is an undesirable pattern that develops when two or more **halftone** screens overlap at improper angles in the printing process. A moiré can also appear in a halftone if the image contains fabric or other finely textured surfaces. Sometimes a moiré appears on TV screens when the camera pans across a striped pattern or certain textures in clothes. Preventing a moiré pattern from appearing in printed images has always been of prime concern

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to **prepress** and **printing** technicians. Moiré is controlled through careful adjustment of screen angles when **process color** separations are produced and registered for printing.

***See Also***
Color Separations; Process Color

# Monitors

Display monitors are the part of the Mac you look at the most, so it is worth getting a monitor that doesn't cause eyestrain or give you a headache. A tilt-and-swivel monitor stand can help put the monitor at a comfortable angle, but a clear, sharp, flicker-free image better prevents health problems. Monitors also differ in other ways—size, number of control knobs, and features. Knowing which of these features are important to you can aid your work on the Mac.

All display monitors create an image by shooting beams of electrons through a grill onto a screen coated with a phosphorescent material. A monitor can use one of two types of grills, an aperture grill and shadow mask, which focus the beams in slightly different ways. Aperture grill cathode ray tubes, such as the Sony Trinitron, tend to produce sharper images. The beams are aimed at thousands of tiny dots called **pixels** . The beams hit each pixel one at a time until the entire screen is drawn. They draw an entire screen full of pixels around 60 times per second.

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Most display monitors sold today are color monitors, although grayscale monitors are still available. The difference in price between grayscale and color has diminished over the years, and most people find a color interface either useful or just more pleasant than grayscale. People who have color-deficient eyesight might save some money by getting a grayscale monitor.

The number of colors or grays you can display has little to do with the monitor. Most monitors today can display 16.7 million colors, which is enough for photographic-quality images. If there is a limit to the number of colors, it is in your Mac's video circuitry and the amount of **video read-only memory** (**VRAM**) you have. If the video circuitry supports it, the more VRAM you have, the more colors you can display. The bigger the image area, the more VRAM you need. For instance, with 2M of VRAM, the Power Mac 7500 can display 32,768 colors in an image area that measures 1024 pixels by 768 pixels. With 4M of VRAM, the 7500 can display 16.7 million colors.

The number of colors you can display is known as the *bit depth*, although it some people call it *color resolution*. A bit depth of 1 bit per pixel gives you 2 colors (black and white). A bit depth of 8 bits per pixel gives you 256 colors or grays, and 16 bits per pixel gives you 32,768 colors. You get 16.7 million colors with 24 bits per pixel.

One of great things about the Mac is that if you upgrade by buying a new monitor, you can keep your old one as well. The Mac lets you use two or more monitors by plugging the second into a **video card** you add to an expansion port. Having a second monitor is useful for keeping tool palettes, email, and

other secondary windows while you use the other monitor for your main work documents. Because both monitors act as if they are part of a continuous work space, you can move items from one monitor to the other simply by dragging it over.

The procedure for setting up the second monitor is quite simple. You plug in the video card, plug in the second monitor, and turn on the Mac. You can use the Monitors control panel (called the Sound and Display control panel in System 7.5.2 and Monitors and Sound in System 7.5.3) to change the orientation of the monitor (see the following figure). You simply drag the icon of the second monitor to the position you'd like it relative to the first monitor. If you want the menu bar to appear on the second monitor instead of the first, in the Monitors (or Sound and Display) control panel, drag over the menu bar from one monitor icon to the next.

***See Also***
Cables and Adapters for Monitors; Energy-Star Monitor Issues; Monitors, Common Models; Monitors, Image Quality; Multimedia Monitors; Multisync Monitors; Monitors, Size; Portrait and Pivoting Monitors; VGA Monitors, Using

# Monitors, Common Models

There are hundreds of models of monitors that will work with most Macs, if you count the VGA monitors that work with PCs. You can choose on the basis of **monitor size** , **quality** , and price. Reviews in computer magazines are a

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good source of current information about the fine points of monitors. Generally, the higher quality and more features, the more you will pay. However, the highest-quality monitor isn't always required. This is why it's best if you can see a monitor in person at least once before buying.

The following list of monitors are a cross-section of the most common quality displays and their basic specifications. Apple's line of monitors are included as a point of reference, and make a good starting place for comparisons. Apple's monitors are typically of good or outstanding quality, have a good set of controls, and usually get good reviews from the computer magazines. Also listed here are some of the better third-party vendors that make good alternatives to the Apple monitors in the same class or have exceptional features for specialty applications that the Apple monitors do not have.

Most of Apple's multisync monitors, and many of the third party monitors, will also work with PCs running Windows. The resolutions and refresh rate listed here apply to Macintosh operation only.

**Apple Macintosh Color Display**    The Apple Macintosh Color Display is an entry-level monitor commonly shipped with Performas. It's low on features, but has crisp display.

Specifications:

- Size: 14 inch

- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

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- Tube: Sony Trinitron aperture grill
- Dot pitch: 0.26 mm

**Apple AudioVision 14 Display**  The AudioVision 14 Display was Apple's first attempt at a multimedia monitor, with good success. Though smaller than the AudioVision 17, the sound quality is excellent for a multimedia monitor.

Specifications:

- Size: 14 inch
- Resolutions, refresh rate: 640 by 480 pixels at 67 hz
- Tube: Sony Trinitron aperture grill
- Dot pitch: 0.26 mm
- Special features: Multimedia monitor with built-in speakers and microphone

**Apple Multiple Scan 14 Display**  The Multiple Scan 14 Display is a low-end, multimedia monitor, but without the built-in microphone of the AudioVision series, and with a tube of somewhat lesser quality. Its features include a headphone jack on the front panel, and it is a multisync monitor that can display multiple resolutions.

Specifications:

- Size: 14 inch

- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

  800 by 600 pixels at 75 hertz

- Tube: Shadow Mask

- Dot pitch: 0.28 mm

- Special features: Multimedia monitor with built-in speakers and headphone jack.

**Apple Multiple Scan 15 Display**   An entry-level multisync monitor at the 15-inch size, often sold with lower-end Power Macs.   Also includes built-in speakers, though of lower quality than the AppleVision series.

Specifications:

- Size: 15 inch

- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

  832 by 624 pixels at 72 hertz

- Tube: Shadow Mask

- Dot pitch: 0.28 mm

- Special features: Multimedia monitor with built-in speakers and headphone jack

**Apple Multiple Scan 17 Display**   The Multiple Scan 17 Display is a good-

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quality multisync 17-inch display that produces crisp, bright colors, and sharp images.

Specifications:

- Size: 17 inch
- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

  832 by 624 pixels at 72 hertz

  1024 by 768 pixels at 75 hertz

- Tube: Sony Trinitron aperture grill
- Dot pitch: 0.26 mm

**AppleVision 1710AV**  The AppleVision 1710AV is one the top multimedia monitors available, and one of Apple's best monitors. It has better sound than any other multimedia monitor, and what Apple calls a "next-generation" tube that produces crisp, sharp images. It also features a robust set of sound and video controls on the front panel.

Specifications:

- Size: 17 inch
- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

  832 by 624 pixels at 72 hertz

1024 by 768 pixels at 75 hertz

1152 by 870 pixels at 75 hertz

1280 by 1024 pixels at 75 hertz

- Tube: Sony Trinitron aperture grill
- Dot pitch: 0.26 mm
- Special features: Multimedia monitor with built-in speakers, microphone, and headphone jack

**Apple Multiple Scan 20 Display**   The Multiple Scan 20 is Apple's 2-page multisync monitor, which produces a sharp display.

Specifications:

- Size: 20 inch
- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

832 by 624 pixels at 72 hertz

1024 by 768 pixels at 75 hertz

1152 by 870 pixels at 75 hertz

1280 by 1024 pixels at 75 hertz

- Tube: Sony Trinitron aperture grill

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- Dot pitch: 0.31 mm

**NEC MultiSync 4FGe 15-Inch Color Display**   The 4FGe is a good alternative to the Apple 14-inch monitor line, stacking up favorably against traditional Trinitron-based monitors. The NEC 4FGe's Invar alloy shadow gives a higher contrast and brighter image than most other monitors in its class. NEC AccuColor system allows individual adjustment of the degree of color from each of the three RGB color guns. 508-264-8000

Specifications:

- Size: 15 inch
- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

  832 by 624 pixels at 72 hertz

  1024 by 768 pixels at 75 hertz

- Tube: Sony Trinitron aperture grill
- Dot pitch: 0.28 mm

**NEC MultiSync XE17**   Good all-around image quality and handy on-screen controls make the NEC MultiSync XE17 one of the better 17 inch monitors you can find for all-around quality. 508-264-8000

Specifications:

- Size: 15 inch

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- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

  832 by 624 pixels at 75 hertz

  1024 by 768 pixels at 75 hertz

- Tube: shadow mask

- Dot pitch: 0.28 mm

**NEC MultiSync XE21**   The XE21 is a two-page display that features a good set of on-screen controls and bright, colorful displays. 508-264-8000

Specifications:

- Size: 21 inch

- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

  832 by 624 pixels at 75 hertz

  1024 by 768 pixels at 75 hertz

  1152 by 870 pixels at 75 hertz

- Tube: shadow mask

- Dot pitch: 0.28 mm

**Portrait Display Labs Pivot 1700**   The Pivot 1700 is a different type of pivot monitor: instead of a portrait shape that pivots into a landscape mode, it is a standard 17-inch landscape monitor that pivots into a pseudo-portrait

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mode. 510-227-2700

Specifications:

- Size: 17 inch
- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

  832 by 624 pixels at 72 hertz

  1024 by 768 pixels at 75 hertz

  1152 by 870 pixels at 75 hertz

  1280 by 1024 pixels at 75 hertz

- Tube: shadow mask
- Dot pitch: 0.26 mm
- Special features: Pivots between portrait and landscape

**Radius PressView 17 SR**   With features such as good color calibration software, small dot pitch, and very high resolutions, the PressView 17 SR is aimed at graphics professionals. The monitor also features excellent image quality and precise on-screen software controls. 408-541-6100.

Specifications:

- Size: 17 inch
- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

832 by 624 pixels at 750 hertz

1024 by 768 pixels at 75 hertz

1152 by 870 pixels at 75 hertz

1360 by 1024 pixels at 75 hertz

1600 by 1200 pixels at 69 hertz

- Tube: Mitsubishi aperture grill

- Dot pitch: 0.25 mm

- Special features: High-end color calibration and color management software

**Sony Multiscan 17sfII**   The Sony Multiscan 17 combines excellent image quality with good controls and onscreen displays that show you the settings. It sets the standard for image sharpness and has a very small dot pitch for crisp displays. Yet, the Multiscan 17sf2 is not one of the more expensive monitors and is a good value. 408-894-0555.

Specifications:

- Size: 15 inch

- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

832 by 624 pixels at 75 hertz

1024 by 768 pixels at 75 hertz

- Tube: Sony Trinitron aperture grill
- Dot pitch: 0.25 mm

**ViewSonic 17GA** For those looking for a less expensive multimedia monitor alternative to the AppleVision 1710AV, the ViewSonic 17GA offers good colors. The sound of the built-in speakers is not as good as the AppleVision 1710AV, particularly in the bass frequencies, but it better than average. It also doesn't offer the 1280 by 1024 picture resolution that Apple's high-end multimedia monitor includes.

Specifications:

- Size: 17 inch
- Resolutions, refresh rate: 640 by 480 pixels at 67 hz

    832 by 624 pixels at 72 hertz

    1024 by 768 pixels at 75 hertz

    1152 by 870 pixels at 75 hertz

- Tube: shadow mask
- Dot pitch: 0.26 mm
- Special features: Multimedia monitor with built-in speakers.

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# Monitors Control Panel

If your Macintosh has a **grayscale** or **color monitor**, you can make adjustments to the monitor or set up your system to use multiple monitors through the built-in video controls in the Monitors Control Panel.

If you have a color monitor, you can choose to display the monitor in black and white, various levels of grayscale, or color. Depending on the amount of **VRAM** installed in your Macintosh, you can select:

- Black and white

- 4 Bit (16 grays or colors)

- 8 Bit (256 grays or colors)

- 16 Bit (thousands of colors)

- 24 bit (millions of colors)

Grayscale monitors obviously cannot display color, so your choices in the Monitors Control Panel are limited to black and white, or a level of grayscale. In System 7.5.2 and higher, you can also set your screen depth (your option

for how many colors or shades of gray will be displayed) from the Control Strip. (The Control Strip was introduced first on PowerBooks, and most models of PowerBooks can set their screen depth from the PowerBook version of the Control Strip.)

The Macintosh enables you to run multiple monitors (up to six at one time if you so desire), and that's accomplished through the Monitors Control Panel. When you open the Monitors Control Panel, you'll see an area with icons that represent each of the monitors connected to your Mac. You first need to determine which monitor will be the "main" monitor (which will contain the menu bar and the Apple menu). One of the icons in the Monitor window will have a miniature menu bar on it. That is the default main monitor (automatically numbered 1). To make another monitor the main monitor, click and drag that menu bar to the icon for another monitor.

These monitor icons in the Monitors Control Panel seem to float in the middle of a wide open space, but this area is used to represent the real monitor's physical location. If you connect a second monitor to your Mac, for example, and you're going to put it to the right of your main monitor on your desk, then you need to have the icons in the Monitors Control Panel look the same way; the main one in the middle, and the second one to the right. You do this so your cursor knows where to go when move it from your main monitor to the second monitor. With only one monitor connected, your cursor will stop when it hits one of the four sides of your screen. But when you connect another monitor, your cursor can move over to that monitor without obstruction, as if you had one long monitor. By telling the Mac, in the

# M

Monitors Control Panel, where the second monitor is, it opens up the side and lets your cursor travel beyond the screen, over to the second screen without interruption.

You can also set the size of the screen display (measured in pixels) by clicking the Option button in the Monitors Control Panel and selecting from the list of screen sizes. The default for a 13- /14-inch monitor is 640x480 pixels.

To use the Monitors Control Panel, follow these steps:

1. Open the Monitors Control Panel from the Control Panels submenu on the Apple menu (or System Folder).

2. Choose a monitor setting of Colors or Grays by clicking the appropriate radio button, then choose the bit depth you want to display.

3. To use multiple monitors, click the monitor you want to be your main monitor, and drag the icon of the menu bar onto that monitor. Click and drag the second monitor icon to match the physical setup of your monitors on your desk.

4. To switch built-in video settings to a different screen resolution, click the Options button and make your selections from the list.

***See Also***
Built-In Video; Color Monitor; Control Strip; Grayscale Menu Bars; Monitor; Radio Button; VRAM

# M

# Monitors, Image Quality

The quality of the image that a monitor produces has to do with several factors, including screen flicker, image sharpness, and image distortion of the image and of its brightness. Each of these qualities can be governed by a number of technologies in the monitor.

**Flicker and Refresh Rate**   You can detect a flicker in a monitor if the refresh rate is too low. The *refresh rate* is the speed at which the electron gun inside the monitor draws the screen—quickly scanning rows of pixels from top to bottom. The faster the electron gun can write, the more stable and flicker-free your screen appears, and the higher your screen refresh rate is. Lower quality monitors have lower refresh ratings and produce a noticeable flicker, like that of a fluorescent light, which makes working hard on your eyes.

Manufacturers of monitors specify the refresh rates in terms of Hertz (HZ). A monitor with a 67 Hz refresh rate redraws the screen image 67 times per second. Refresh rates above 60 Hz appear flicker-free to most people, though some can still detect flickering in some lighting conditions. A refresh rate of 75 Hz is fast enough to prevent flicker in any lighting condition.

**Sharpness**   The *sharpness* of an image is determined by several factors. One of these is the type of grill used to focus the beams of electrons aimed the screen. There are two types, the aperture grill used in the Sony Trinitron tube, and the shadow mask grill. Aperture grill tubes are usually, though not

always, crisper than shadow mask grills.

Another design point affecting sharpness is *dot pitch*, the space between pixels, the tiny points of light in rows across the screen. A smaller dot pitch means smaller pixels, which correspond to more detailed and sharper images—if the monitor is calibrated correctly. Most quality monitors have a dot pitch of 0.28 mm or less. A small dot pitch rating is necessary for fine detail work with images and stringent CAD/CAM, where accuracy is very important. Because smaller pixels are closer together, a higher degree of detail can be achieved on-screen. Poor dot pitch ratings, in the high 30 and even 40 mm range are not recommended for exacting graphics work.

The term dot pitch most commonly refers to monitors with shadow mask grills; for "aperture grill" displays, the term is stripe pitch.

Another factor that affects the sharpness is *convergence*, the capability of the read, green, and blue beams inside the cathode ray tube to accurately hit their target pixels on-screen. When the three beams don't exactly hit the same spot, you'll see a colored corona around the edges of images. Better monitors have controls that let you adjust the convergence, but some monitors have better convergence than others. Computer magazines that review monitors often measure the misconvergence, that is, the amount the beams are not aligning. Generally, a misconvergence under 0.2 millimeters is considered good, and the closer to zero, the better.

**Image Distortion**   *Image distortion* is when the monitor bends straight lines when displaying them. Distortion typically occurs near the corners of

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the screen. Bigger monitors often have more problems with image distortion than smaller monitors. Another type of distortion called pin cushioning occurs when a monitor bends the edges of the screen inward. Better monitors have controls that let you adjust for pin cushioning. These controls are a good idea, since pin cushioning can occur when you switch between resolutions on multisync monitors.

**Brightness**    The brightness of a monitor can also be distorted, in that different areas of the screen are displayed at different brightness. To check for non-uniform brightness, you can bring up a white screen. You can easily do this by creating a new folder, opening it, and have it fill the screen. Because color is also affected by non-uniform brightness, you might want to test a monitor by filling it with a color. The easiest way to do this to go to the Desktop Patterns control panel, and select a pattern that is all one color. Then shut all windows and look at the Finder.

One more point about brightness: Monitors tend to dim over the years, as the phosphorescent coating on the inside of the cathode ray tube loses some of its luminance. To compensate, it's a good idea to buy a monitor that is bright enough so that you don't have to turn the brightness control all the way up, even in the brightest lighting conditions.

*See Also*
Monitors

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## Monitors, Size

Like television screens, the size of computer display monitors is given as a diagonal measurement from one corner of the screen to the next. However, the actual size of the display image is less than the given measurement for the **cathode ray tube** . For instance, the diagonal measurement of the image area of a 13-inch monitor is 11.5 inches. This is because there is an area of black around the image that acts as a buffer zone in case you need to adjust the width or height of the image area.

When purchasing a monitor, you should pay attention to both the monitor's advertised CRT size (usually 14, 15, 17 or 21 inches) and the monitor's advertised viewable image area, also called the diagonal viewing area. Monitors with the same CRT size can have substantially different viewing areas, and in some rare cases, a display advertised as 14 inches may have a larger viewing area than a display advertised as 15 inches. After of several lawsuits alleging false advertising were filed against monitor manufacturers, the manufacturers have agreed to note BOTH the displays' CRT size and diagonal viewing area. Pay attention to both numbers.

Monitors typically come in four standard size ranges:

- Small monitors measuring from 12-to-15 inches were once the standard, but are now considered entry-level or home monitors.

- In business applications, mid-sized monitors, from 16-to-17 inches, are beginning to replace 13-inch monitors as the standard computer

display. This is because prices for the mid-sized monitors have dropped considerably and offer more room for viewing tool palettes or large documents.

- A 17-inch monitor can't quite fit a full 8.5" by 11" page on-screen, but it does give you about 50 percent more screen space than a 14-inch monitor at 72 dots per inch.

- If you do want to display an entire page, you need a **portrait monitor**. These monitors are shaped differently than other monitors, basically following the shape of a piece of letter paper. Portrait monitors typically measure 15 inches diagonally, though they have more space than standard 15-inch monitors.

- Large monitors, measuring 19-to-21 inches, can display two full 8.5" by 11" pages. These monitors are standard in desktop publishing, computer graphics and design, and CAD. Of course, they are also useful for anyone who needs to keep a lot of windows open at the same time.

Beyond the standard sizes, there are extraordinarily large monitors used for giving presentations in front of a group of people. These monitors can be as large as 37 or 40 inches and cost many thousands of dollars. These monitors are good for displaying to a roomful of people; any bigger situations, such as an auditorium, require wall projection systems for proper visibility.

***See Also***
Cables and Adapters for Monitors; Energy-Star Monitor Issues; Monitors;

# M

Monitors, Common Models; Monitors, Image Quality; Multisync Monitors; Multimedia Monitors; VGA Monitors, Using

## Monopoly

*See*
Classic Collection

## Monospaced Fonts

The major difference between typewritten text and typeset text is that in the former each letter is the same width. Typeset text generally uses **proportional fonts** , in which some characters are narrower or wider than others. But digital monospaced fonts are available; they're often used for typesetting material like computer code and for other text that should look as though it was produced on a computer or a typewriter. Two common monospaced Mac fonts are Monaco and Courier.

*See Also*
Fonts; Proportional Fonts; Typeface Categories

## MOO

*See*

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MUDs and MOOs

## Moof

"Moof" is the call of the infamous **dogcow** . Because the dogcow is half dog and half cow, its call is naturally half dog and half cow also: "moo" and "woof."

*See Also*
Dogcow

## MooVer

MooVer can take a folder of **PICT** files and turn it into a **QuickTime** movie. Optionally, it can add subtitles to each frame of the movie.

This program is shareware ($10) and available from online services.

*See Also*
MoviePlayer; Peter's Player

## Morph

Gryphon Software's Morph is named to fit its function. This software is suitable for beginners just starting to learn to manipulate the magic worlds

# M

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of warping and morphing, as well as it is a challenge to experienced professionals who think they've seen it all. The advanced morphing, warping and "caricaturing" options that this software possesses allow you to produce extremely complex still and animated graphics. Using only a few simple tools, Morph is capable of generating startling high-end results.

Morph has a small movable toolbox with seven tools: Selection Arrow, Point Tool, Connecting Line Tool, Scissors (Cut), magnifying Glass (Zooms), Hand (Move Image), and Rotation Tool. The editing screen looks like a Storyboard, which is exactly what it's called. In fact, images in a Morph sequence may be printed out as a true storyboard. A source and a target space inhabit the storyboard, areas where you place source and target graphics. Still images can also be imported for viewing, and finished movies may be played on the Morph screens.

Morph operates in a classic morphing software fashion. Points and lines are placed around important elements of the source image, and show up over the target image. The points and lines are moved on the target image to reflect important elements. Once placed, a preview can be generated that shows how the outlined elements will move from source to target shapes. When points and connecting lines are where they should be, a movie is made that allows the source image to transform into the target. This is how all basic morphing programs work, but Morph has tools that take its possibilities far beyond the basic expectations.

In addition to being able to generate a sequence of morphing images

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between two graphics, Morph allows you to continue with as many internal graphics as your computer's memory will support. New source/target pairs can be added to the sequence, points and connecting lines placed around their important shapes, and the whole process repeated again. Default images of seven American presidents are included with the program to allow you to experiment with an elongated sequence, transforming one to the next in a series. All of this is accomplished without making the process any more difficult than it is in working with only two images. The final quality of the images can be selected from low, good and better.

**Warping** Morph can generate quality warps. All aspects of the image can be altered by deft placement of the control points and their associated lines. Previews can be generated before you commit to the final renders. By placing control point and lines guides around the elements to be altered, background elements of the image can be prevented from moving. Any warped graphic can be exported as a PICT, Tiff or Photoshop image.

**Morphing** As part of the previewing process, still images can be generated from any intermediate frame in a morphing sequence, and you might select to export these previews as a still image. The final quality and magic of a morphing sequence depends entirely upon how carefully the points and connecting lines are placed. The connecting lines have bezier-like controls, so they can be shaped to follow the conforms of the selected graphic very closely. Morph also allows you to create a morphic movie or series of images from two animated sequences, the difference being that points and lines will require more movement as the animations progress. Birds in flight can

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become airplanes in flight, and running pigs can become bounding dogs. All it takes is a little practice and some dedicated time.

**Caricatures** Unique to Gryphon's Morph is the possibility of creating photo-realistic caricatures, images that have exaggerated elements that transform them into photo-cartoons. A reference image is used to apply its features to a target image, and the resulting rendering is previewed and (if you like it) saved. No other morphing package offers this direct capability.

**Animation** Gryphon's Morph has all of the expected controllers for generating animated morphs of any size and frame rate. Compression choices, size, key frame placement, image quality, time code options and keytime elements are all configurable by the user. Multiple morphs can be moved around and displaced by one another as if the software were an Edit Decision List processor (EDL), an advanced function that allows maximum control over the final animation.

**Save / Load Conventions** Movies can be exported as QuickTime, PICS, PICT, Photoshop and TIFF, and single images as PICT, TIFF and Photoshop. You can also save and load the setup files for any sequence, warp or caricature.

**Documentation** The documentation is complete and easy to understand, and is peppered with adequate tutorials and images. Better yet, the software is so intuitively designed, you probably won't need to reference the documentation at all after a few sessions of exploration. Because of its capability to generate warps, morphs and caricatures, Gryphon's Morph is recommended for beginners, intermediate learners and seasoned pros.

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# Morphing

This effect takes two images and creates an effect where one image seems to reshape itself into another. There are several applications that enable you to create these sophisticated effects on a budget, such as Gryphon's **Morph** and Avid's **Elastic Reality** .

These programs take two images or clips and morph them together to create a still image or a clip of the morph. The morphing effect is defined by drawing control points and lines on the two images that indicate the parts of the image that morph together. A control point, for example, might be added to the eyes in the first image. The same control point appears on the second image, and you must drag this point to the eyes of the character in the second image (assuming you are morphing a face to a face).

Morphing effects depend on two things.

- The subjects in the image. Iif you are morphing a face, short hair seems to morph much better than long frizzy hair. Also, the more control points you add, the better the effect.

- The consistency of the background. If the background from image to image is the same, then the morphing effects are more noticeable and more effective. If you morph between images with different backgrounds, the morph happens over the whole image, and will look more like a cross-fade or dissolve transition effect than a morph.

# M

Gryphon Software
7220 Trade Street, Suite 120,
San Diego, CA, 92121.
Price: $149
Fax: (619) 536-8932
Phone: (619) 536-8815
Web: http://www.gryphonsw.com/

*See Also*
Elastic Reality; Morph

# Mortal Kombat
*See*
Violence in Games

# Mortimer
The captivating scenes from the **Family Entertainment** title **Mortimer** from LucasArts are what you would expect from a television movie—not a CD-ROM. LucasArts' previous releases, such as **Rebel Assault** and **Full Throttle**, have been games targeted at adults. Mortimer uses the Rebel Assault INSANE engine (Interactive Streaming Animation Engine) so action sequences may look familiar.

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However, instead of flying through vast reaches of space and shooting storm troopers, you can zoom around on the back of a flying snail, zapping frozen animals back to life. The plot of Mortimer surrounds the villain Lodius who has turned animals into statues in the process of stealing their powers and appropriating their physical characteristics. A minor education element is added by allowing you to interact with the twenty-eight animals you revive and learn more about them through short video clips, but Mortimer is mainly a lot of fun for kids, without the usual violent content.

***See Also***
Are You Afraid of the Dark?; Family Entertainment; Foul Play; Masterpiece Mansion; Yellow Brick Road II

# Mosaic

***See***
NCSA Mosaic

# Motherboard

***See***
Power Mac Logic Boards

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## MountImage

MountImage is a **freeware control panel** by Steve Christensen that enables you to mount **disk images** made with Apple's Disk Copy on your **desktop** and treat them as if they were mounted disks. MountImage also enables you to copy disk images onto disks without having to use Apple's Disk Copy. MountImage can be found in the Macintosh Utilities Forum on America Online or at various FTP sites on the Internet.

*See Also*
Control Panel; Desktop; Disk Images; Disks; Freeware

## Mouse

The pointing device known as a "mouse" was introduced in 1963, and since that time has become the most successful means of pointing or moving objects on a screen. Every Mac comes equipped with a mouse. These pointing devices have evolved over time, but there are basically three types: an electro-mechanical mouse, the newer opto-mechanical mouse, and optical mice.

• **Electro-Mechanical Mice.** The first Apple mouse, introduced with the Lisa in 1983, was used with the Mac 128K, 512K and 512KE, as well as the Mac Plus, and Apple IIe and IIc. This square box housed a ball that drove two wheels whose edges were ringed with metallic encoders. The

ball moves the wheels which creates and breaks a current when the encoders spin past electrical contacts. These mice used a heavy gray ball and sliding retainer ring and were manufactured in the United States.

- **Opto-Mechanical Mice.** There have been three generations of opto-mechanical mice. The first opto-mechanical mouse used a lighter-weight black ball with a rotating retainer. This assemblage was made in Taiwan and was not a success due to its light-weight effect on the pointer's movement. The second generation mouse uses a heavier gray ball with a rotating retainer and is made in Malaysia. The newest mouse—the ADB Mouse II—has a rounded shape with the ball located closer to the front of the assemblage.

  Each opto-mechanical mouse operates similarly using light-emitting diodes (LEDs) and light-sensitive transistors, called **phototransistors** , to register the movements of a rubber encased metal ball (see the illustration). A rubber ball touches two capstans, which in turn drive two wheels whose edges are metallically encoded. The encoded wheels are wedged between two photosensors and light sources. When the ball is rolled, the capstans turn the wheels and their ridges interrupt the light. Each break in the light is interpreted by the Mac as an increment of movement. The direction of mouse movement is defined by which photosensor picks up the interrupt first.

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- **Optical Mice.** Third-party vendors are offering mice that use lasers and a sensing pad in the place of a rubber ball and wheels to track mouse movements. The light is shown from two sources and reflects off a pad covered with a fine grid of dots. The image of the grid is projected onto two separate photosensors, one senses vertical movement and the other horizontal movement. The reflection of the grid passes over the sensors, allowing circuits within the mouse to count the dots to determine the distance the mouse has moved in either direction.

All types of mice use a single button configuration (although other vendors offer 2-, 3-, and 4-button versions). The button actually is a small switch (called a *microswitch*) that completes a circuit when pressed. The Mac's OS checks the state of the mouse button each time the video circuits finish painting a complete screen image (about 60 times per second). The button is used for selecting (highlighting) and dragging objects on the screen.

The mouse and trackball are relative-motion pointing devices. This means that the mouse reports how far it has moved and in which direction, but does not tell the Mac where it is on the desk or mouse pad or on the screen in absolute terms. Although this method is fast, it lacks the precision of absolute-motion pointing devices like **graphics tablets** . Such pen-based devices report the exact location of the stylus relative to the tablet's surface, which is mapped to the Mac's display.

**Care and Cleaning**   Over a period of daily use, the mouse ball picks up dirt

particles, making it sticky and unreliable. To avoid this, use a mouse pad. They are inexpensive (often given away as advertising items, such as the one you get from Apple when you register your new Mac) and keep contamination out of the mouse's rolling mechanisms. Mouse pads also provide a more efficient and consistent rolling surface. Choose one with a nice photo or graphic image and it will brighten up your working environment.

But a mouse pad can't keep all dirt out of the roller. Periodically, you need to open the mouse and clean it (see your Apple manual for instructions). You can buy mouse cleaning kits with swabs and fluid at most computer stores, or less expensive Q-Tip™ swabs and alcohol at the drugstore. Cleaning usually requires using a swab or a dust-free cloth to remove dirt and dust from the mouse's internal rolling parts—the wheels, capstans, and ball.

**Mice, Cordless**  Another option for pointing and clicking is the cordless mouse. If you are using presentation software, such as Adobe Persuasion or Microsoft PowerPoint, you probably want to move around the room and not be tied to the Mac by the mouse's cable. The cordless mouse uses an infra-red link to an ADB adapter and run on rechargeable batteries.

Cordless Mice

| Manufacturer | Model Name - Features - Street Price |
|---|---|
| Logitech | Cordless MouseMan - Radio-frequency controlled with 4 channels, Opto-mechanical mouse curved to fit the |

contours of the hand. Right and Left-hand versions - $79.95

Logitech            TrackMan Live Cordless - trackball uses radio frequencies to control the cursor up to 30 feet away from Mac. Three programmable buttons with trackball - $129.95

***See Also***
Absolute Versus Relative Motion; Apple Desktop Bus; Cordless Mice; Graphics Tablets; Keyboards; Pen/Handwriting Devices; Trackballs; Touchpads; Touch Screens

# Mouse Control Panel

The settings for your mouse are on this control panel. You can adjust how the **cursor** reacts to the speed you move the mouse, and you can adjust the speed of a **double-click** so that when you double-click the Mac knows it's a double click and not two single clicks. Apple created this control available because people double-clicks at different speeds. If you're double-clicking and not getting the desired result, you may have to slow down the Mac's recognition of your double-click.

To use the Mouse Control Panel, follow these steps:

1. Open the Mouse Control Panel from the Control Panels submenu on the

Apple menu (or System Folder).

2. Choose the setting that best suits you by clicking the radio buttons. After you make a selection, move the mouse to see if the speed feels right to you.

3. You can also set your double-click speed. Look at the little graphic of the mouse to the left. When you select a radio button, this graphic displays an animation of the double-click speed for each setting.

***See Also***
Apple Menu; Cursor; Double-Click; Mice

# Mouse Keys (Keyboard Shortcut)

If you have the **Easy Access** Control Panel installed, you can activate the **Mouse Keys** feature of Easy Access by pressing ⌘-Shift-Clear. (Clear appears in the **numeric keypad** of your keyboard.)

To activate the Mouse keys feature of Easy Access using a keyboard shortcut, follow these steps:

1. Press the ⌘-Shift-Clear keys to activate Mouse keys.

2. Mouse keys will be activated. To disable Mouse key, press the keyboard shortcut again.

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# Movie Cleaner Pro

Movie Cleaner Pro and Movie Cleaner Lite (a shareware version of Movie Cleaner Pro) are designed for the serious **QuickTime** movie producer who has to process a lot of clips. Movie Cleaner Pro batch processes movies, and it has several features that are geared toward improving CD-ROM playback performance.

The blur option softens edges and reduces video noise in the image, making it possible to achieve better compression rates. Another filter removes random pixel noise, improving compression of sequences with little change in them. You also can interrupt the compression and compare before and after images.

Movie Cleaner attaches a custom color palette to a movie, and you can specify the **frame rate** . Unlike Adobe's **CD-ROM Movie Maker** , it can not create a color palette and you cannot specify locations for **key frames** .

Movie Cleaner is useful to anyone who has several movies to compress or is looking to get the best performance from their movies. If you already own Adobe **Premiere** , then the CD-ROM Movie Maker utility offers most of the features found in Movie Cleaner. The shareware version, Movie Cleaner Lite,

# M

can be downloaded from Terran Interactive's Web site.

Terran Interactive
Price: $129
Email: info@terran-int.com
Phone: (408) 353-8859
Web: http://www.terran-int.com

*See Also*
CD-ROM Movie Maker; Premiere; QuickTime

# Movie Play

A free **QuickTime** movie player. Originally developed as part of **CameraMan** (a screen capture utility), it is available with Motion Works **Multimedia Utilities** package, or from several online sites.

It's small, simple to use, and can be used in place of Apple's **MoviePlayer** application (although MoviePlayer offers several extra features that are useful for editing).

Motion Works International
524 Second Street
San Francisco CA 94107
Phone: (800) 800-8476 or (415) 541-9333
Fax: (415) 541-0555

# M

CameraMan; MoviePlayer; Multimedia Utilities; Peter's Player; QuickTime

## MoviePak

*See*
MediaTime

## MoviePlayer

A viewing and editing application, MoviePlayer is available via the **Internet** and the **QuickTime CD-ROM** . MoviePlayer is a very useful utility that not only plays movies but also creates new ones using simple editing techniques.

To create or edit a movie, simply hold the Shift key and drag in the time bar of the movie (see figure). The highlighted section of the bar indicates the area of the movie that has been selected. Choose cut or copy to remove or copy that portion of the movie. Create a new movie or open an existing movie, and then paste the clip.

*See Also*
Movie Cleaner Pro; QuickTime; Premiere

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*See Also*
Movie Cleaner Pro; QuickTime; Premiere

## MovieShop

A **QuickTime** utility developed by Apple, MovieShop has never officially been released (or supported), and while has not been updated recently, it can still be obtained through Apple's developer program. This utility provides many controls and options when **recompressing** (converting from one QuickTime **compressor** to another) an existing QuickTime movie. Its capability to limit the data rate during compression is not so important now that the **Cinepak** compressor offers a data limitation parameter.

If you need a batch recompression tool, try **Movie CleanerPro** or the **CD-ROM Movie Maker** utility for Adobe **Premiere**.

*See Also*
Compressor; CD-ROM Movie Maker; Movie CleanerPro; Premiere;

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Recompression

## MovieTrilogy

MovieTrilogy is a shareware collection of **QuickTime** utilities. While they don't offer the features of commercial programs, they are inexpensive! DeskTopMovie is a movie player application that can read text-track movies if PlainTalk is installed. DeskTopText creates QuickTime movies containing scrolling lists of text. DeskTopTV records video on AV Macs. ScreenMovie records what is happening on the Macintosh's screen as a QuickTime movie.

These programs are available online, or send $30 to the author:

Paul Ho
P.O. Box 87042
Village Square Postal Outlet
2942 Finch Ave. East
Scarborough, Ontario, CANADA, M1W 2T0.

***See Also***
CameraMan

## Moving FX

Both Adobe Premier and After Effects can be augmented by third party plug-

# M

in filters, greatly expanding their uses for computer artists and animators. Gryphon's Dynamic Effects is a series of plug-ins for Premier, and Final Effects from MetaTools is a plug-in for AfterEffects.

*Dynamic Effects* Gryphon Software's Dynamic Effects is an absolute necessity for anyone who works with Adobe Premier. It adds eighteen separate filters to Premier's list, and replaces two of Premier's wipes with better ones (Wipe and Iris are replaced by Smooth Wipe and Smooth Iris). The eighteen effects add image processing tricks based on Gryphon's experience gained with its flagship morphing software, Gryphon Morph. The documentation goes through each one, and a tutorial at the back walks users through a process that shows how to layer the filters for specific image processing results. Most of these filters are accompanied by an animated preview screen that allows you to see the effect (and any alterations you make to it) in action on your image or image sequence. Each of these effects has to be explored to be fully appreciated

Here is the list:

- GDE Channel Delay— Allows you to delay any of the image's color channels (Red, Blue, Green and Alpha)

- GDE Channeler— Allows channel swapping and recombining in a dynamic fashion

- GDE Color Lookup— maps a selected palette to a range of pixels. Several sample palettes are included with the software (chrome, fire,

spectrum, and zebra).

- GDE Duotone— Forces the image or sequence to become a two—color duotone

- GDE Dust— Adds dust or speckles to the graphics, making it appear old and worn.

- GDE Dynamic B&C— Creates a smooth transition of brightness/contrast levels

- GDE Dynamic Solarize— A smooth transition, across the entire clip, between two levels of solarization

- GDE Dynamic Twirl— Forces an animated twirl on the clip, with user controls for start/end angles, eases, interpolation and circular types, as well as the number of bands (zero to infinite).

- GDE Dynamic ZigZag— Forces a rippling water effect on the clip, with user controls over the parameters

- GDE Luminance Jitter— Randomly varies the luminance value of each frame, adding to a bad lighted movie effect

- GDE Mirror— Produces extremely attractive symmetrical animations with user selectable centers of symmetry

- GDE Offset Jitter— Produces an effect like that of a film off of the sprockets

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- GDE Roll Tiles— Clockwise and counterclockwise tiling animations

- GDE Room— Throws the clip into a dynamic 3D room

- GDE Soft Focus— Animated blurring effect

- GDE Tempus— Image delays introduced into the animation from data based upon loaded grayscale maps (a library of these come with the software, or you can create and save your own). Indescribable image alterations are the result

- GDE Threshold— Animated posterization

- GDE Tunnel— A zooming 3D tunnel effect

*Final Effects* MetaTools, known for the quality and variety of its plug-in graphics filters in the Kai's Power Tools set for Photoshop compatible programs, is also the developer of Final Effects, a set of animation oriented plug-ins for Adobe's After Effects software. These filters add functionality and variety to the already extensive filters that ship with After Effects. As is expected from MetaTools products, these plug-ins cover areas that the animator didn't even know existed. All of these effects are customizable according to user input.

They include:

- **Distort Menu:** FE Flow Motion— produces strange and alluring gravitational effects that pull and funnel the image.

FE Griddler— Cuts an image up and animates it into square sections.

FE Lens— Creates infinite lens distortion animations.

FE Slant— Dynamic tilts of the image horizontally.

FE Slant Matte— Creates drop shadows for the image.

FE Tiler— Tiles the image over the screen.

FE Color Offset— Rotates the value of each RGB color channel.

- **Image Control Menu:** FE Threshold— Creates masked areas for non-alpha channeled images from Luminance (brightness) signals.

  FE Threshold RGB— Creates masked areas for non-alpha channeled images from RGB (color) signals.

- **Light Menu:** FE Lightburst— Places a burst of light on the image, usually targeted to its alpha channel.

- **Particle Menu:** FE Ball Action— Transforms the image into sizable balls, rather like academic molecular models.

  FE Bubble— Creates a bubbling effect in the chosen layer.

  FE Particle Systems— A full blown particle system that creates evolving particles of user designed shape and density over time. Listed choices include Explosive, Sideways, Fire, Bonfire, Twirl, Fountain, Viscous, Scatterize, Sparkle, Vortexy, Rain Drops, Starlight, Smokish, Bubbly,

Bally, Watery Drops, and Experimental (spheres fading towards edges). The documentation has dozens of examples and graphics. This filter is reason enough for any serious digital artist and animator to purchase both After Effects and Final Effects. Consider that any of these effects can be applied to any targeted 3D animation.

FE Particle Systems LE— A simplified version of the full blown particle systems, because the control parameters are fewer. The effects include some filters not included in the higher version however: Fractal Explosion, Jet, Jet Sides, Firefly, and 2E Experimental (like dust blowing up from the ground).

FE Pixel Poly— Breaks the targeted layer into polygons.

FE Rain— Creates a very realistic rain-like effect.

FE Snow— Creates a very realistic snow-like effect.

FE Starburst— Creates a very realistic starburst effect.

**Perspective Menu:** FE Sphere— Wraps the intended graphic on a controllable sphere.

• **Stylize Menu:** FE Kaleida— Used to make animated kaleidoscopic graphics. Lots of fun!

FE Page Turn— uses one graphic to reveal another by turning its edge over.

FE Scatterize— Scatters the pixels of the graphic over time, as if they were turning to sand and dispersing in the wind.

- **Transition Menu:** FE Image Wipe— Uses one image to wipe-reveal another.

  FE Radial Scale Wipe— A radial wipe with folding edges used to reveal another image below.

  FE Scale Wipe— Stretches one image to reveal another.

  FE Twister— twists and contorts the target image.

- **Channel Menu:** FE Composite— Allows you to composite two images on a single layer, controlling the opacity of each.

# MPack

A freeware application for the Mac by John Myers and Chris Newman that encodes and decodes **MIME** attachments, files other than text documents that can be attached to **electronic mail** messages sent on the **Internet**.

MIME attachments may include graphics or other multimedia files. They must be downloaded and read by an email client that supports MIME, such as **Netscape** or **Eudora**.

Sometimes, however, MIME email files cannot be opened by an email reader. In that case, simply open MPack, choose Decode from the File menu, and

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navigate to the files you want to open. You will then be asked to specify a location for the documents.

MPack can be downloaded from the Internet at:

> http://wwwhost.ots.utexas.edu/mac/pub-mac-compression.html

*See Also*
Attaching Files; Email; Eudora; Internet; MIME; Netscape


# MPEG

MPEG (Motion Picture Experts Group) is a compression format that is the motion video equivalent of **JPEG**. MPEG works well with video sequences and has been adopted for a wide range of hardware. Unfortunately, MPEG is highly **asymmetrical**. It takes a lot of processing horsepower to compress an MPEG sequence. For full screen playback, you need special MPEG hardware.

**QuickTime** supports MPEG, although it does not currently include MPEG compression routines. Software decompression for Power Macintosh models is available in QuickTime 2.5

Note that there are several MPEG standards (MPEG, MPEG2, and MPEG3). These are generally backward compatible. MPEG has not yet gained wide acceptance, because specialized hardware is required to create MPEG movies.

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# MPTA

# MPW

Apple's primary **development environment** for Macintosh
programming. MPW, an acronym for Macintosh Programmer's Workshop, is
a powerful command-line-based environment that hosts a vast number of
**compiler** s and other tools.

The MPW environment is similar in many ways to a traditional **UNIX**
development environment. Individual development tools, such as compilers
and **linkers** , are run from a command line or by using scripts. Compilation
and linking are governed by **makefiles** , which specify the relationships
among source and object files.

Although this sort of environment has a long learning curve and is poorly
suited to small projects, for larger projects with many separate parts, it's
tough to beat. It's not unusual for MPW users to build all the various parts of

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a complex project by issuing a single command. For example, a large project may include 68K, Power Mac, and "fat" versions of an application, an Extension or Control Panel, and one or more special code resources to define custom controls or menu styles within the program. Using an **IDE**, such an undertaking would generally require several separate project files that would all have to be brought up to date, compiled, and linked. With MPW, everything can be controlled by a single makefile. This gap is closing, however, and many Mac IDEs now provide extensive **scripting** support, so that you can use **AppleScript** or **Frontier** to accomplish the same things as a makefile would in MPW.

MPW is extremely customizable. You can write complex and powerful scripts, modify or add to its menus, and attach scripts to keyboard commands.

Many third-party compilers and development tools are available for the MPW environment. Metrowerks **CodeWarrior** includes MPW versions of its **C/C++** compilers in addition to its own IDE versions. In addition, many compilers are available exclusively as MPW tools. The Motorola C/C++ and **FORTRAN** compilers fall into this category.

MPW and Apple's MPW-based tools are available from Apple in two forms: MPW Pro and E.T.O. (Essentials, Tools, Objects), both of which are distributed on CD-ROM only. MPW Pro includes the MPW environment, assemblers and C/C++ compilers for both 68K and Power Macintosh, the Macintosh Debugger, **ResEdit** and **MacsBug**, the **MacApp** framework, and the **Macintosh Programmer's Toolbox Assistant**.

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E.T.O. is Apple's deluxe collection of developer tools. In addition to everything included in MPW Pro, E.T.O. includes **Symantec C**++ , an electronic version of **Inside Macintosh** , and a slew of useful utilities and prerelease versions of upcoming development tools. Unlike MPW Pro, E.T.O. is sold as a subscription; your purchase price buys two updates in addition to the initial versions you receive when you buy.

Note that most third-party compilers that rely on MPW also include a copy of the MPW environment, although they generally do not include the full complement of tools supplied with MPW Pro or E.T.O.

### *See Also*
C; C++; CodeWarrior; Compiler; IDE; Inside Macintosh; MacApp; Macintosh Programmer's Toolbox Assistant; MacsBug; ResEdit; Scripting; Symantec C++

# MrC

MrC (pronounced "Mister C") is Apple's highly-optimized **C/C**++ **compiler** for the Power Macintosh. MrC is available as an **MPW** compiler, or as a plug-in compiler for the **Symantec C**++ and Metrowerks **CodeWarrior IDE**s. The C++ version is sometimes called MrC++.

### *See Also*
C; C++; CodeWarrior; IDE; MPW; Symantec C++

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## MTBF

MTBF stands for Mean Time Between Failures. It is the average time it takes for a product to fail (to cease normal operations). Commonly quoted for hard disks, it is derived from a statistical analysis of product testing commonly done in the manufacturer's facilities.

MTBF and the related measure, **MTTR** (Mean Time to Repair), are both defined officially by the **ISO** and **IEC**. A further measure, **MTTSR** (Mean Time to Service Restoral) is not. This latter measure is, however, a useful means of calculating the real running cost of any given device.

***See Also***
MTTR; MTTSR

## mTropolis

mTropolis is a **multimedia authoring** program that can create cross-platform titles. Editing must be performed on a Macintosh, but players for Macintosh and Windows are provided. Like the authoring tools **HyperCard** and **SuperCard**, and unlike Macromedia's **Director**, mTropolis takes an object-oriented approach to project development. In **object-oriented programming**, objects inherit properties from other objects. For example, if highlighting is a property attached to a parent button, that property works in other buttons that are attached to the parent button; they inherit the

highlighting property from the parent.

Object-oriented programming can be very powerful when creating complex interactions (it can eliminate a lot of duplication of work), but because it is also a very different way of thinking from traditional programming, it can take some time to learn.

Projects in mTropolis are broken down into sections that contain scenes. A scene is what appears on-screen. Media elements are added to a scene by drawing a frame, using the Rectangle tool, and then linking an object, such as a QuickTime movie, to that frame. These elements can be shared across multiple scenes.

Many actions can be added in mTropolis simply by attaching a modifier to a button. To trigger a sound when a button is clicked, for example, a sound modifier is attached to that button. Multiple modifiers can be attached to the same object. A dialog box enables you to specify the parameters for the modifier. Some of these are quite complex, including collision detection and path-based animation. mTropolis includes a proprietary cel-animation format called mToons and a utility called MovieTrax that creates and edits multiple track QuickTime movies.

For situations that require more complex behaviors, mTropolis includes a simple scripting language called MiniScript, and programmers can write external routines similar to HyperCard **XCMD**s. This, however, requires a level of programming and development sophistication even many professional developers will lack.

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Unlike the competing tools (Director, SuperCard and HyperCard) completed projects are distributed as documents along with a Player. mTropolis does not create a combination document and player file.

Documentation of the first release is rather limited, but a CD containing examples is included.

With its high price compared to its primary competitor Macromedia Director, mTropolis is intended only for the professional multimedia developer. For large complex projects mTropolis could pay for itself; not only is Director complicated by its non-object oriented methodology and its animation orientation, it is almost impossible for several people to work on the same movie at the same time. But expect to spend some time becoming familiar with mTropolis, particularly if you have never worked with object-oriented programming techniques.

System requirements are: Macintosh 68020, System 7.x, at least 5 MB for the application when authoring, and 2MB for the player. Under Windows: 486SX/25 or better, 8-bit color and at least 2MB of application RAM.

mFactory Inc.
1440 Chapin Avenue, Suite #200
Burlingame, CA 94010
Price: $4,995
Fax: (415) 548-9249
Phone: (415) 548-0600
Web: http://www.mfactory.com

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# MTTR

MTTR stands for Mean Time to Repair. It is the sum of all time taken to repair a failed device in a given period divided by the number of times the unit fails in the same period.

MTTR does not include maintenance, fault detection and diagnosis, or downtime. It is a measure of the average time taken to bring a device back to service after repairs have begun.

MTTR and the related measure, **MTBF** (Mean Time Between Failures), are both defined officially by the ISO and IEC. A further measure, **MTTSR** (Mean Time to Service Restoral) is not. The latter measure is, however, a useful means of calculating the real running cost of a device.

# MTTSR

MTTSR stands for Mean Time to Service Return. It is a measure of the average time it takes to return a failed device to normal functionality. For each

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failure, the clock starts ticking the moment the device fails and stops only when the device is functioning normally again. It takes into account fault detection, fault diagnosis, down-time, and repair time.

The mean is established by dividing the total time the device is out of service in a given period by the number of times it is out of service in that period.

Although not an officially defined measure of the running cost of any device, it is a very useful one.

***See Also***
MTBF; MTTR

## MTV's Club Dead
***See***
Adventure Games

## MUDs and MOOs
A text-based, collective forum on the **Internet** that enables groups of people to engage in virtual realities, and often rich fantasies and alter egos, all in real time. Similar to **Internet Relay Chat,** with the addition of the virtual reality element.

MUD stands for *Multi-User Dungeon* or *Multi-User Dimension.* Similar

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variants are MUSH (Multi-User Simultaneous Hallucination) and MOO (MUD, Object Oriented). A MOO is a more complex form of MUD that allows an environment containing objects to be described as text.

Although communications in a MUD are text-only, their anonymity promotes creativity and fantasy. Participants can assume alter egos and describe themselves any they want. MUDs and MUSHs were originally created to provide multiplayer role-playing adventure games. After you reach a certain level of proficiency, you are allowed to modify the environment in real time. Each environment includes a special vocabulary used to convey gestures, emotions, and actions.

Some business applications of MUDs have been proposed, such as a virtual office space in which coworkers can meet with clients anywhere in the world.

Although MUDs generally run under UNIX, a Macintosh client exists, called MacMud. You can also connect to other UNIX MUDs with a simple MUD client program, MUDDweller. Another client, called Meeting Space, is billed as a virtual conference room.

**Multi-User Dungeons for Entertainment Uses** Differing from other types of online entertainment, **MUDS** are strongly linked to **Role-Playing Games**. MUDS are also similar to text based adventures like the original Zork titles because all of your commands are typed and most of the time, the areas are text based. MUDS, in a nutshell, are spaces on the Internet devoted to creating an entirely immersive role playing environment. The adventure is

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not scripted and the experience one has within a MUD differs from individual to individual. Basically, you create a character who suits the theme of the MUD, such as a spy in a MUD devoted to a James Bond theme or a Wizard in a fantasy/medieval area. Then you start wandering around interacting with things. The coolest part is that as you wander, there are other Internet MUD travelers, who you encounter in real time and can talk to, interact with, fight, team up with and basically chat with, as in any other online chat room, only you need to stay in character and the talk is pure fantasy (not that most chat room conversation is not just that).

To get onto a MUD, you just figure out the **Telnet** address, make sure than you have an Internet account that supports Telnet, and dial in. One problem you might encounter is that not many major online services support Telnet because of its text-only platform, but there are smaller services dedicated to games that all have Telnet access. (Delphi is one of the few commercial services that provides full text-based access to the Internet.) Play starts immediately on connection. From there, you create your character and receive your quest which can range anywhere from a simple find command to a more complicated journey that will require an entire team of players to accomplish. To help out beginners, most MUDS offer a help feature, but you really learn by trial and error.

You can drop your character in some and get a few pointers on what you are doing, but many serious players in the more hard-core MUDS may be offended enough to kill you if you bring the real world into their fantasy. Many problems have arisen over gangs that take over certain MUDS and kill

whoever comes unknowingly into their territory. As you travel, just make sure to bone up on the specific etiquette of the area you are in and, if you are beginner, try not to offend anybody.

If you do die, you can usually come back to life, but you'll lose all your equipment, weapons, and a healthy chunk of your experience points, which, as you know if you are familiar at all with Dungeons and Dragons and role playing, can be devastating.

MUDS tend to change addresses quickly, without notice, but there are some comprehensive lists on the net to show you where to go. Try checking out http://www.interplay.com/mudlist to find out if there's anything out there for you.

***See Also***
Internet; IRC; Internet Services; Network Gaming; Online Live Games; Shareware

# Multifunction Drives and Jukeboxes
CD-ROM drives that do double duty as Magneto-Optical readers.

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**MULTIMEDIA**

Strictly speaking, the term *multimedia* is used to define any presentation or production involving more than one media type. In practice, multimedia is usually taken to mean something that includes **animation**, **sound**, **video,** or **interactivity** —using just text and graphics is called **desktop publishing** !

What multimedia means to you depends upon what you want to do with multimedia. If it means playing games and entertainment titles, then you don't have to do much at all. Most Macintosh systems today come well equipped to play back any entertainment title available. You might need to install new software, like the latest version of QuickTime, or a new technology like QuickDraw 3D, but otherwise you will not have to do too much to your hardware. If you have the money, faster CD-ROM drives (you can get 6x speed drives) make the playback of these titles even smoother, and consider buying external **speakers** to drastically improve the quality of audio playback.

If you are interested in multimedia authoring, then there is a lot to cover. In addition to basic **graphics** skills, you need to learn about **Sound** software

and hardware, as well as **3D** software before you even get to **Multimedia Authoring** . If you need digital video, read about **QuickTime** and **video digitizing** as well.

There are a wide variety of tools available for creating multimedia presentations, from simple interactive presentation tools, such as **Special Delivery** , **Apple Media Tool** and **Astound!** , to the more complicated and sophisticated authoring tools, such as **Director** , **HyperCard** , **SuperCard** , **mTropolis** , **Media Objects** , and **Authorware** .

**Conversation with Don Norman**

Don Norman brought the discoveries of cognitive psychology to computers, showing us all *The Design of Everyday Things*, as he put in the title of his book, and explaining to designers what does and does not work for an ordinary user. Norman is head of the Advanced Technology Group at Apple, in charge of polishing the interface and improving the power of new operating systems such as Copland.

**Maclopedia:** What were your first impressions of the Mac?

**Don:** My first impressions were of disappointment. I had already experienced better. I was a professor at the University of California, San Diego: I had seen, owned, or worked with superior graphic user interfaces, including Sun computers, Symbolics LISP machines, the Xerox PARC Alto, and even the Apple Lisa. The Mac was small, quaint, and impoverished compared to these other machines. Of course, it was also

considerably cheaper, for it was aimed at the home marketplace, whereas the others were not, but nonetheless, to a professional, it was a letdown.

Now, this being said, it wasn't too long before my own personal machine was a Mac. I went off for a sabbatical in England carrying a Mac Plus and used the machine extensively. (That's when I wrote the book *The Design of Everyday Things* on that Mac.) DOS machines were unthinkable—they were so poorly configured and so antiquated that it never even entered my mind to consider them. Yes, I was disappointed in the Mac, but in many ways, this followed Alan Kay's pronouncement of it: "The Mac is the first machine good enough to be worth criticizing."

**Maclopedia:** How did you get involved with the Mac project, first, and what changes did you push for in the design?

**Don:** I became a consultant to Apple's Advanced Technology Group (ATG). It never occurred to me then that I might some day not only be a member of ATG, but the head. As a consultant to ATG, I worked with a number of people—all of whom still at Apple on projects such as learning. I interacted a lot with Joy Mountford's Human Interface Group—HIG is what they called themselves. And I issued pronouncements now and then about the state of the art. I didn't really get involved in design until I officially joined Apple in 1993. Since that time I have pushed for many changes. In my opinion, the

machines from all manufacturers have simply become too complex. It is time for a return to the simplicity and elegance of the Mac Plus. We need systems that are easy to learn, that do the task we need and that do not require so much time and effort to learn, to configure, and to upgrade. Things like the operating system ought to be invisible to the everyday user. It is time for a change—a large change.

**Maclopedia:** Looking at the best of the Mac and Windows 95 products, what are some examples of the way the Mac is still in the lead, as far as interface goes?

**Don:** The Mac was designed for ease of use from the bottom up. This makes a difference. When one adds new equipment—a modem, or another hard drive, or a CD-ROM—it is truly "plug and play". Just plug it in and use it. My friends keep asking me about settings and drivers and I keep saying "what?" Mac users do not have to worry about them.

I have two displays on my computers, one which is mostly used for desktop management (directories and the like) and the other for my work. It is painless to move files and windows from one screen to the other: This ability is built into the OS. Not so with Windows. AppleTalk makes home and school networks effortless. Buy some cables, plug the computers into one another, and boom, you are networked. I have done it in airports, passing files to a passing friend. Try that with Windows!

Connecting to remote networks is easy. I dial my office from my home (or while on trips across the world), and am connected to the Apple

engineering network, where I have complete access to my files, to my mail systems, and even to my printers. If I want to print a document on my assistant's desk, I can do so, even if I am 3,000 miles away. It just takes a phone call.

AppleScript means that applications pass information from one to another. Again, an Apple exclusive. The list of superior aspects is actually quite large. Alas, the one point that Apple fails is marketing and advertising. Nobody seems to know about the good points.

The next operating system, code-named Copland, brings some other major advances, especially in information management. Watch for it.

**Maclopedia:** Do you get time to do any more writing and teaching these days?

**Don:** I teach classes as guest lecturer now and then. I think I will have done 4 lectures in classes this year. I don't have time to do a whole course: I travel too much to be available on a regular schedule.

**Maclopedia:** How have your former colleagues in the universities reacted to your books and your work for Apple?

**Don:** Quite well. In fact, after I joined Apple, I seemed to be in greater demand among my university colleagues. I get frequent requests to give talks at universities or to visit. And I am on the advisory boards of five different universities [in three countries].

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**Maclopedia:** What new directions do you foresee under Apple's new CEO, Gilbert Amelio?

**Don:** Dr. Amelio has already taken charge at Apple and instituted a number of changes. He is leading us to a new, more powerful, more focused Apple. I am very optimistic about our future.

The simple interactive presentation tools enable you to create a presentation containing graphics, **QuickTime** , and audio by simply clicking and dragging objects into position. You can create buttons that cause the presentation to jump from screen to screen, but you are usually limited in the level of sophistication, because the programs don't have any **scripting** language. These kind of tools are great for many applications and are generally easy to learn.

The more sophisticated authoring tools add scripting or some very complex sets of options to make it possible to test user input, perform mathematical calculations, and generally add any feature you can imagine. But this flexibility often comes at the expense of ease-of-use. Expect to spend much more time learning how to use these tools.

Which program you should choose depends upon a large number of variables, including the kind of presentation you want to create, whether you need **cross-platform** compatibility (play on Macintosh and Windows systems), and how much money you can spend.

While there are a lot of tools, and each has strengths and weaknesses, don't

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think that you have to learn everyone. this is particularly true of the authoring tools. Learn one of these tools well and you should be able to create just about any project you need.

Finally, some new software technologies (specifically, **QuickDraw 3D** and **OpenDoc**) are appearing first on the Power Macintosh. These new technologies make some very exciting new tools possible, although these are only just now starting to appear.

***For More***
If you want to do this...

Go to this entry...

Create a multimedia presentation

Multimedia Authoring

Create or play a digital movie

QuickTime

Create interactive documents

Electronic documents

Record videoDigitizing Video

Record sound

Digitizing Audio

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Build 3D models

    3D

***Bibliography***
For more information, refer to:

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Michael D. Murie, Hayden Books (ISBN: 1-56830-113-8)

Provides an introduction to multimedia and how to author multimedia productions.

*Desktop Video Studio,*

Andrew Soderberg and Tom Hudson, Random House Electronic Publishing.

Primer on creation and processing of digital video.

*How to Digitize Video*

John Wiley & Sons

Guide to hardware and software for video capture and compression.

*Multimedia Demystified, A Guide to the World of Multimedia and Apple Computer, Inc.*

Apple Computer, Inc.,  Random House Electronic Publishing

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A comprehensive look at the markets, media, and organizations making up the multimedia industry.

*3-D Starter Kit for Macintosh*

Sean Wagstaff, Hayden Books

Introduction and guide to 3-D graphics.

*Apple CD-ROM handbook—A Guide to Planning, Creating and Producing a CD-ROM*

Apple Computer, Inc., Addison-Wesley Publishing Company

Covers production of CD-ROMs step-by-step, cover planning, production, legal, and financial considerations.

# Multimedia on the Internet

Just as the Macintosh is especially well suited to presenting multimedia on the desktop or in the boardroom, the Mac also excels at presenting multimedia on the **Internet** .

The growing popularity and commercial use of the **World Wide Web,** the graphical **Internet service,** means that increasingly sophisticated applications for presenting sound, video, animation and other multimedia are appearing online.

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While some multimedia on the Internet is presented by standalone applications such as **SoundMachine**, others are played by plug-ins that work with **Web browser** s such as **Netscape Navigator**.

**Sound on the Internet** Sound on the Internet can be presented in formats such as **AIFF** (Audio Interchange File Format), **MPEG** (Motion Picture Experts Group), or .**AU**. Some System 7 sounds might also be found on the Net.

The following table shows the common file formats listed with their sizes, benefits, and drawbacks.

Audio File Formats

| Format | Platforms | Size - Benefits - Drawbacks |
|--------|-----------|------------------------------|
| System 7 sound | Mac | Small - not able to compress Click and Play simplicity, can be used as system sound - Mac only |
| AIFF | Windows/PC, Mac, UNIX, Amiga | Varies - not able to compress - Wide compatibility H i g h quality sound equals huge sound file |
| MPEG | Mac, Windows/PC, UNIX | Small size relative to sound quality - compressible |

| | | Excellent sound quality - Agonizingly slow, no good Mac player (yet) |
|---|---|---|
| AU | UNIX, Windows/PC, Mac | Varies - not able to compress - Wide compatibility M a n y slight variations in format |

To play sound files you download from the Internet, you need **helper applications** like SoundApp, **Sound Machine,** or MPEG/CD and MPEG Audio for PowerPC. MIDI files downloaded from the Web need to be processed by an application like **AllMIDI.**

Another kind of sound file is presented by **RealAudio.** RealAudio files use **streaming** , i.e., they are played by RealAudio as the file is downloaded. To play them, you can use the RealAudio Player application or a RealAudio plug-in that processes the files while you are still in the Netscape Navigator window.

**Video on the Internet** Many sites on the Web serve video files. Most are in **QuickTime** format, which is native to the Mac, but you might also find files in MPEG format.

QuickTime movies can be played with the QuickTime extension and Movie Player applications included with System 7.1 and later operating systems.

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(Simple Player, also by Apple and with controls identical to Movie Player's has also been widely distributed.) A QuickTime plug-in for Netscape Navigator was still being eagerly awaited as this was written.)

Apple's QuickTime VR Player is an exciting Internet application that plays both regular QuickTime movies and VR movies. VR moves are *visual representations* of scenes where in you can pan around a full 360 degrees by clicking and dragging.

MPEG videos downloaded from the Web can be played with the application Sparkle, which also plays QuickTime clips.

**Multimedia, Animation** A number of ways are being developed to being animation to the World Wide Web. Like many complex graphical elements presented over the Internet, however, their performance is limited by bandwidth, the capacity of the viewer's Internet connection to transmit data. Many users with slow dial-up modem connections have to wait agonizingly long to see a **Shockwave** animation or **Java applet,** for instance.

*Shockwave* is a plug-in for Netscape Navigator that allows animations created with Macromedia Director to be played within the Netscape browser window.

Netscape version 2.0 now supports the display of *Java applets,* small computer programs that use the Netscape window as a virtual computer. Some simple animation effects can also be created with **JavaScript,** Netscape's version of the Java programming language. **Roaster** is an application that also plays and creates Java applets.

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*Multipart GIF89a images,* also supported by Netscape Navigator, are GIF images that consist of several separate frames or images. The series of images, when played together as a **multipart GIF,** provides simple animation on a **Web page** displayed by Netscape.

A number of virtual reality applications and plug-ins using **VRML** (Virtual Reality Markup Language) were beginning to appear as this was written, several being developed for the MacOS

As the Web grows more popular, more complex multimedia elements will appear on Web pages and continue to challenge the limitations of speed and bandwidth faced by many users without fast direct connections to the Internet.

### See Also
AIFF; AllMIDI; Applet; .AU; Bandwidth; Helper Applications; Internet; Internet Services; Java; Modem; MPEG; Multipart GIF; Plug-Ins; RealAudio; Shockwave; Sound Machine; Streaming; VRML; Web Browser; Web Page; World Wide Web

# Multimedia Monitors

The newest type of displays are multimedia monitors, which include built-in stereo speakers and often a built-in microphone. Most multimedia monitors have 17-inch screens and support multiple **picture resolutions** . You can get better sound with separate speakers, but the built-in speakers take up less

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space and require fewer cables. Instead of a separate cable for left and right speakers, as well as a speaker power cable, you have a single cable from the Mac's sound out port to the monitor.

Multimedia monitors are best suited for home computers, where the neatness factor of fewer cables and less space are more valuable. Multimedia monitors also cost only 5-to-10 percent more than ordinary 17-inch monitors. However, Graphics professionals usually want bigger monitors, and audio professionals will probably want higher quality speakers.

The sound quality of multimedia speakers varies quite a bit from one manufacturer to the next. Speakers that face down or to the back won't sound as good as those mounted on the front of the monitor facing the user. It's also good to ask about the power rating of the speakers. The higher the power rating, the better the speakers are likely to sound.

Speakers that look like they were glued onto a monitor usually don't produce good sound. Sound caverns inside the case help create deeper, richer sounds, particularly in the bass frequencies. The AppleVision 1710AV probably has better sound than any multimedia monitor on the market because of it's internal air channels. The following figure shows the Apple AudioVision.

Another feature to look for is easy-accessible monitor and volume controls. Separate bass and treble controls are desirable but not found on all monitors. Another handy feature is a front-facing headphone port and a separate headphone volume control.

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# Multimedia Speakers

# Multipart GIF Image

A multipart GIF image is a type of graphic image that appears to be animated when displayed on the **World Wide Web**  by the **Web browser Netscape Navigator**  2.0.

**GIF**  (Graphic Interchange Format) is a type of image compression widely used to present inline or external images on **Web page** s. One variety of GIF image, called GIF89, allows one color in its palette to be designated as "transparent," thus allowing the image to seem to "float" on the background of a Web page.

Another feature of GIF89 images is that they can consist of not just one, but multiple images or "frames." Such a series is called a multipart GIF image.

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A Web browser that supports "looping" of multipart GIF images plays all of the frames over and over again. If the frames have been arranged to simulate motion, the multipart GIF image will appear to be animated.

Multipart GIFs present a number of advantages to Web page designers: they provide simple animation effects without the complicated programming required by languages like z. No plug-ins or additional software are needed to create the animation effect.

At this writing (February 1996) only Netscape 2.0 supports multipart GIF images, although other browsers are likely to follow suit.

For more information see the following Web site:

   http://members.aol.com/royalef/gifanim.htm

***See Also***
External Image; GIF; Home Page; Inline Image; Internet; Web Browser; Web Page; World Wide Web

# Multipurpose Internet Mail Extensions
***See***
MIME

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## Multiscan

*See*
Multisync Monitors

## Multisession CD

The original **CD-ROM** format was a nonwriteable format. Each CD had an index containing information about the disc: location of the tracks, number of tracks, and so on. With the advent of **writeable CDs**, it became possible to record a single disc, and it also became possible to add information to an existing writeable disc, provided it wasn't already full. But because the disc directory could not be updated (the discs cannot be rewritten) a way of adding extra data to an existing disc had to be invented. This is the **multisession** disc format.

When new information is added to a writeable CD, a new directory, or index track, is also added. When this is done, the disc becomes a multisession disc (i.e. data has been written to it at separate times). A multisession-capable player looks for the other index tracks when it detects a multisession disc. If a multisession CD is used in a CD player that does not recognize multisession discs, the player will recognize only the first session (what was written to the disk the first time). All new CD drives support the multisession format, and if you are using an older drive, it is likely that it is multisession-capable if it is at least a double-speed drive.

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One of the first implementations of the multisession format was for the **PhotoCD** system developed by Kodak.

*See Also*
CD-I; CD-ROM; DVD; PhotoCD; Writeable CD

# Multisync Monitors

Multisync monitors give you a choice of the number of pixels you want to display on-screen, presented as a picture resolution measured in number of pixels wide by number of pixels high. A typical Mac picture resolution is 640 x 480 pixels. Some Mac monitors, such as Apple's entry-level 14-inch Macintosh Color Display, have a fixed picture resolution, which means that you can't change it from 640 x 480. A 14-inch multisync monitor (also called multisynchronous, autosync, or multiscan) gives you a choice of several picture resolutions such as 640 x 480 and 800 x 600.

Displaying more pixels on-screen gives you a bigger desktop but shrinks the images. For instance, 640 x 480 pixels on a 13- or 14-inch monitor works out to display 72 dots per inch (dpi), which is know as **WYSIWYG** (pronounced "Wizzy Wig") display, or "What-You-See-Is-What-You-Get." You can tell you have WYSIWYG when an inch in an application's ruler on your screen actually measures an inch long. At 800 x 600 pixels on a 14-inch monitor, you no longer have 72 dots per inch, and therefore no longer have WYSIWYG. An inch marked on a ruler would measure less than an inch. This has no effect

on the way the file would print, but you do get the benefit of seeing more at one time on your screen. A high picture resolution with a smaller-than-WYSIWYG display comes in handy when you have a lot of tool palettes open, such as in graphics or desktop publishing, or when you need to see an entire document, such as a large spreadsheet.

For a 16-inch or 17-inch multisync monitor, the correct WYSIWYG picture resolution is 832 x 624 pixels. For a 21-inch monitor, 1152 x 870 is the WYSIWYG resolution. If you switch to 640 x 480 pixels on these bigger screens, objects will appear larger than WYSIWYG—an inch on a ruler will measure more than an inch. This is a handy feature if your eyesight is suffering or if you are planning to give a presentation to a room of people sitting further away.

You change the picture resolution of a multisync monitor in a control panel. In older versions of Mac OS, it's the Monitor control panel, and in newer version, it's the Monitors and Sound control panel (see the following figure). Most multisync monitors can switch between picture resolutions on-the-fly (without restarting). You can also buy adapters that allow you to select a picture resolution by setting dip-switches on the plug itself—handy if you have a multisync monitor, but no "switch-on-the-fly" software.

The first Mac monitors had fixed picture resolutions, but now even most of Apple's monitors are multisync. However, because multisync monitors can be bought outside the Mac-exclusive sales community, Mac owners looking to buy one can find very good prices in the larger and more competitive

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PC/Windows market. Often, the multisync model was meant for a PC machine, and will require an in-line or "pass-through" plug adapter to reconfigure the monitor's pinouts to fit the Mac's; check with your vendor for plug adapters that fit your particular brand of monitor. Most computer stores that carry Macintoshes have these inexpensive line adapters.

However, just because you can use multisync monitor doesn't necessarily mean you can use it to display the resolutions the monitor supports. For instance, the video circuitry in the old Mac IIci could only display at 640 x 480 and 640 x 870 (portrait mode). For these Macs, you'll need to add a video expansion card to take advantage of the multiple resolutions of a multisync monitor. Fortunately, most modern Mac models can display at multiple resolutions. All the Power Macs, as well as Quadra, and PowerBooks with monitor ports can display resolutions up to 1,152 x 870 pixels. The old PowerBook 100 and the Duo Dock can display at 640 x 480 and 832 x 624 pixels.

***See Also***
Cables and Adapters for Monitors; Energy-Star Monitor Issues; Monitors; Monitors, Common Models; Monitors, Image Quality; Multimedia Monitors; Monitors, Portrait and Pivoting Monitors; Monitors, Size of; VGA Monitors, Using

# Multisynchronous
***See***

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Multisync Monitors

# Multitasking

In 1984, when Apple introduced the Macintosh 128K microcomputer, multitasking was the providence of minicomputers and mainframes running such operating systems as UNIX or VM-CMS. Microcomputers performed one task at a time. You had to quit one program before proceeding to the next and there was no way to easily share data between programs. The introduction of the Macintosh changed the way people used computers by offering an operating system which allowed the integration of data from one program with another. With the MultiFinder in System 6, Apple began the process of providing an environment that support full multitasking. With System 7, that promise has been fulfilled.

*Multitasking* is the capability to run several programs simultaneously. The first small programs which could be operated along side applications on the Macintosh were, and are, called *desk accessories*, or DAs. DAs are tiny utilities such as a calculator, calendar, alarm clock, notepad, or puzzle. DAs were restricted in size to a couple of kilobytes so they could fit into memory alongside the applications. You opened DAs while working in an application by pulling down the Apple Menu and highlighting its name with the mouse. At first, DAs would run only if their window was currently active. You switched to the DA window from your application's window when you needed to access, say the calculator to perform simple calculations. You could

exchange data between the DA and your application by using the Clipboard, the Macintosh's data exchange file. Thus, you could cut and paste the results of your use the DA into your application. The Scrapbook, Chooser, and Control Panel are all DAs.

As the Macintosh evolved, Apple took the concept of the DA and built from it the concept of working with more than one application at one time. Apple introduced the MultiFinder in System 6 as an optional way of running the Macintosh. The MultiFinder provided a multitasking environment to the Macintosh. With System 6, DAs could continue to run in the background. New uses for DAs were found, such as Talking Moose and Menu Time which used the Finder to perform background processing.

System 7 revolutionizes multitasking, eliminating the memory limitation of DAs. All programs, no matter their use or size, share memory and processing time. DAs are no longer limited to access via the Apple Menu, but like any other program, can be opened and run concurrently via the Application Menu. It is the multitasking features of System 7 that put the greatest burden on the Macintosh hardware.

Like all multitasking systems, System 7 really runs only one program at a time. The illusion of several programs working at once is created by switching between applications so rapidly that it appears that everything is happening at once. The actual goal of multitasking is making use of the various applications' ability to share the systems resources. The difference between types of multitasking lies in the way in which applications pass

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control from one to another. There are three types of multitasking: context-switching, cooperative, and pre-emptive multitasking.

In context-switching multitasking (also called time-sharing), the resources are moved between programs on a fixed schedule. Even if an active programs doesn't currently need resources, it is provided with them. This method can be very wasteful of processing resources. In cooperative multitasking, each program can request the use of the processing resources, but other applications are not forced to respond to these requests. This method relies on the programmers developing applications that are well-behaved in this type of environment. In pre-emptive multitasking, each program is assigned a priority and can compete for resources. MS-Windows 95 supports pre-emptive multitasking for those programs that have been rewritten to take advantage of the capability. It is also expected to be a key element in the next Mac OS, code-named Copland, due later in 1996 or early 1997. Prior to these new developments, only UNIX and mainframe operating systems supported pre-emptive multitasking.

**System 7.5 Multitasking Methods**  The Macintosh uses a combination of context-switching and cooperative multitasking methods. If an application requests resources, it is guaranteed a minimum share. Cooperative multitasking is used to perform background operations with programs that are designed to work in this environment. Cooperative multitasking works by giving control of computing resources to a program to use to perform one task or event and relying on that program to turn control over to the next application when the task is accomplished (or a maximum time limit has

passed). If an application is not designed to cooperate within this environment, context-switching—putting one application on hold to run a second one—is used to allow you to run even poorly behaved programs. Without this feature, most older DAs would operate only when placed in the foreground and stop when moved to the background.

Neither of these multitasking methods is inherently better than the other. Both are "true" multitasking. However, most modern operating systems are moving away from cooperative multitasking and toward preemptive multitasking.

Although purists often do not accept the Macintosh operating system's claim to a multitasking capability because its multitasking is not preemptive (it does not interrupt on one application's event to perform another application's event), System 7 provides extensive performance enhancements for those programs capable of cooperative multitasking (those which follow the Macintosh System Interface Standards). Even without the added benefit of running other multitasking applications, the System 7 Finder's capabilities for printing, copying, and moving data in the background provide significant advantages without the overhead required for a pre-emptive multitasking system.

**Multitasking, the Finder's Role**     The Finder is the Macintosh's file—and disk-management software. The Finder is a special application program which is initiated when you turn on your Macintosh and always runs in the background to assist you in managing disks, applications, and documents. The

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**Finder** performs several important functions which are related to multitasking. Many of these tasks related to the Finder's primary task of file management, but some are specific to enabling **System 7** to provide multitasking capabilities.

MacOS 7.5 preemptively multitasks a few low-level processes such as networking, but cooperatively multitasks other processes, such as applications. As a result, if a single application refuses to give up control, either intentionally or because of a crash, no other application can proceed. The next major release of the MacOS, **Copland**, will provide much greater support for preemptive multitasking of application processes.

A lower-level of multitasking is also possible within a single application. This is known as **threading**. Whenever an application has control of the computer, it executes multiple subprocesses internally. Just as with overall multitasking, threads can be cooperative or preemptive. Threads need not use the same method of multitasking as the system as a whole. For example, an operating system that uses cooperative multitasking can use preemptive threads within programs.

***See Also***
Finder; Memory; MultiFinder; System 7.5; Threads

# Multi-User Dimension
***See***

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MUDs and MOOs

## Multi-User Dungeon
***see***
MUDs and MOOs

## MUNSELL
***See***
Color Matching Systems

## MUSHs
***See***
MUDs and MOOs

## Music Tools for Children
***See***
Julliard Music Adventure, A Little Kid Music, Peter & the Wolf

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## Musical Instrument Digital Interface

*See*
MIDI

## Musicshop

A **MIDI** sequencer that works with any MIDI interface and instrument, Musicshop features a tape-deck like interface, and supports up to 16 MIDI instrument tracks per song. The MIDI information can be edited in either standard music notation, or a graphic piano roll style (short and elongated dots represent the note and note duration).

A sequencer can record a performance, and then you can go back and edit the notes by simply clicking and dragging them. After a song is completed, it can be printed Musicshop includes the Adobe Sonata music font for printing.

Opcode Systems
Fax: (415) 856-3332
Phone: (415) 856-3333
Web: http://www.opcode.com

*See Also*
MIDI; Sequencer

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## MYOB

MYOB, which stands for Mind Your Own Business, is an accounting and financial management package geared toward small businesses. It includes general ledger, checkbook, accounts receivable and accounts payable, and inventory modules. It's an ideal program for people who would rather manage their businesses than crunch numbers.

Getting started with MYOB is quite simple. There are seven "command centers:" ledger, checkbook, sales, purchases, payroll, inventory, and card file. Each one gives you access to a particular aspect of running your business. When you start, you'll need to enter information in four of these areas. The first is the General Ledger. You begin by entering your company information. MYOB walks you through the procedure with templates for different types of businesses. There are all kinds of possibilities—from sole proprietorships to retail clothing, restaurants, video stores, crafts stores, medical and law offices, and too many more to list.

After your accounts have been set up, you need to enter starting balances for them, and you'll want to use the card file module to list your clients, your employees, and your suppliers. These names can be entered directly or imported from an existing database. And that's all you have to do, until you buy or sell something. MYOB can generate invoices, purchase orders, checks, shipping labels, 1099s, and practically any kind of form you're likely to need. You can set the program up to use your own preprinted forms and fill in the blanks or to print customized invoices on plain paper.

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To enter a transaction, open the appropriate command center and select the kind of transaction from the chart.

Filling in a paycheck looks much like writing any other kind of check. You've already entered each employee's information in the card file, including where they live and work, and entered their pay information—salary, other income such as tips, commissions, or bonuses, and deductions. In the Write Paycheck window, enter the date and the employee's name. That's all. MYOB looks up the pay information, calculates the salary and deductions, and writes the check, entering the employee's address from the card, and listing all the deductions on the attached voucher, as shown here. Print it, sign it, and you're done. MYOB will track the deductions and remind you when it's time to send in your payroll taxes.

Entering sales and expenses is just as easy. Choose the proper category, enter the amount, and MYOB does the rest. Inventory management is equally simple. Each item you buy, sell, or store, and each service you sell gets an inventory account. With information about each of these things stored in MYOB, you can include them on invoices and purchase orders, keep track of quantities, and analyze your sales and purchasing activity. MYOB keeps a running balance of the number of units on hand and the total dollar value of those units. It computes the average cost of a single item by dividing the total value by the number of units. Whenever you mention the item on a purchase order, it adds the quantity ordered to the existing stock, and when you list it on an invoice, MYOB deletes the number sold from the inventory quantity, and the dollar value of the goods sold from the assets. You can make

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adjustments to the inventory to account for loss, breakage, or other unforeseen events.

MYOB's main feature is its ease of use. If you have no experience at all with bookkeeping, you can usually manage to set up your accounts in a matter of hours. If you've used a regular ledger or "one-write" system, MYOB will be a very pleasant surprise. The flowchart and tabbed folder interface make it easy for users to intuitively do the right thing, and it's accelerated for PowerMac, so it will respond quickly to your need for information, and will leave you more time to actually run your business.

***See Also***
Finance Programs; Quicken

# Myst

**Myst** revolutionized computer games by introducing a compelling, visually stunning game with a twist: there is absolutely no violent content. Myst was one of the first titles to integrate beautiful backgrounds with fluid, rather than jerky, movements through the fantasy environment.

The storyline, created by brothers Rand and Robin Miller, revolves around an abandoned world to which you're suddenly transported. You wander around the island solving brain-boggling puzzles, trying to find out what happened to the former residents and looking for a way to go home. The simple mystery premise combined with engaging tasks has made Myst one of

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the best selling games of all time. In addition to spawning numerous many copy cat titles, such as Sony's **Eastern Mind** and the forthcoming Secrets of the Luxor (based on the hotel in Las Vegas) from Mojave. Myst has also generated a hard-cover fiction novel, penned by the Miller brothers. There are even hints at an upcoming film based on the game.

### *See Also*
The Daedelus Encounter; Eastern Mind; Full Throttle; Hell; Return to Zork; Riddle of Master Lu, the; 7th Guest, the; TimeLapse