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Radio Buttons

Radio buttons are round buttons in **dialog boxes** that enable you to choose from a list of options by clicking the button of your choice, as shown in the figure. If, for example, you choose the **Print** command from the **File menu** in an application, the dialog box might enable you to choose from three different print quality levels: Best, Normal, or Draft. Each of these choices has a corresponding radio button. To select an option, **click** the radio button beside your choice. When you click a radio button, a smaller black circle appears within the radio button to confirm that it's selected.

Radio buttons are mutually exclusive, meaning they're designed for situations where only one option from a list can be selected. In the previous example, you can only choose one print quality: Best, Normal, or Draft. You can't choose Best and Draft; you have to choose one or the other. Radio buttons are linked behind the scenes, so if you click one radio button, any others for that particular selection are automatically deselected.

See Also
Click; Dialog Boxes; File Menu; Print

Radius PressView 17 SR

See
Monitors, Common Models

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RAID Arrays

RAID stands for *Redundant Array of Inexpensive Disks*, although it is also sometimes written as *Independent* rather than *Inexpensive*. Perhaps the drive manufacturers don't want to give you the wrong idea.

The RAID concept originally appeared when small **disk drives** were slow and large drives were fast and expensive. Several inexpensive drives, linked together to create a RAID drive, appear to the Macintosh as a large virtual drive that has a much faster **transfer rate** than the individual small drives. This is achieved by splitting the data across the drives as it is being written. Alternatively, data can be duplicated between multiple drives to create an on-the-fly **backup**.

Several manufacturers now offer RAID drives. These are sold as a single case containing multiple mechanisms, along with the special software needed to format and use the drive. A RAID drive appears on the Macintosh desktop like a normal single disk drive.

There is also software available that can be used to create a RAID using existing separate drive mechanisms. This is an inexpensive way of creating a faster and larger drive, but it might not be the best thing to do. For best performance, the drives should have the same capacity. Also, it's best to work with relatively new drives; a failure of either drive makes all data useless. For these reasons, it's probably best to buy a dedicated RAID drive if you need the performance.

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With the dramatic reduction of disk drive prices in the past few years, some of the reasons for RAID no longer exist; but a RAID drive is still generally faster than a single-drive mechanism, making it particularly useful for demanding video digitizing tasks. Before buying, check the **throughput** required by your **digitizer** and the specifications for the RAID and single-drive mechanisms before spending the extra money for a RAID.

See Also
Backup; Disk Drive

RAM

See
Memory

RAM Cache and RAM Disks

By using a RAM cache and/or setting up a RAM disk, you are manually setting aside a part of your system's memory where it can store frequently used items from your **hard disk** . By keeping these items in this separate memory, your computer can quickly access this information rather than searching on the hard disk each time it needs that data.

Both the amount of memory set aside for a RAM cache (also called disk cache) and the creation of a RAM Disk are accessed through the **Memory Control**

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Panel.

See Also
Disk Cache; Hard Disk; Memory Control Panel

RAM Doubler

RAM Doubler, from Connectix Corporation (2655 Campus Drive, San Mateo, CA 94403, Phone: 800.950.5880, Web site http://www.connectix.com), works with System 6.05 or higher and uses a **Virtual Memory** scheme to fool your Macintosh into thinking there's twice the available **RAM** than there really is. RAM Doubler works quite well and is popular with PowerBook users whose units shipped with a minimum amount of RAM.

The implementation of RAM Doubler is very simple: Install the application and **restart** your computer. If you had 8MB of RAM before you installed RAM Doubler, upon restart the system will act as though it has 16MB and will enable you to open applications until you've reached your new 16MB limit. To see how RAM Doubler affects your system, choose the "**About This Macintosh**" dialog box at the top of the Apple menu with RAM Doubler on. You'll see two figures for memory: Built-in memory (which is the actual figure for your installed RAM) and Total Memory (which is double your installed memory, courtesy of RAM Doubler).

See Also

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About This Macintosh; Not Enough Memory Message; RAM; Restart

Random Access Memory
See
Memory

Random Data Access
This random data access is made possible because a disk drive's read/write heads can move back and forth across the face of a disk while the disk is spinning. Data stored close to the center of a disk is, in practical terms, no further away from the read/write heads than data stored at the very edges of the platter.

Range Finder
A range finder camera uses a separate lens to provide the preview of the image you are taking with the camera. When you look through the camera's view finder, you aren't seeing what the lens is seeing, because you are looking through the separate lens.

Range Finder cameras are a problem when taking a picture very close to an object (differences between the actual camera's lens and the view finder

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lens are greatest as objects move closer to the camera). Range Finder cameras are also a problem if you use a lens attachment to adjust the focal length of the lens.

Compared to **SLR** cameras, Range Finder cameras are cheaper and easier to make, they also tend to be lighter, and quieter (they don't have to flip up the mirror while the picture is being taken.)

See Also
Digital Still Cameras; Focal Length; SLR

Raskin, Jef

Jef Raskin, a former professor turned computer consultant, joined Apple in 1978 as manager of the Publications department. Raskin went on to start the New Product Review and Application Software divisions.

More importantly to this book, Raskin was the driving force behind the original Macintosh project at Apple. Long before it looked anything like today's Mac, Raskin envisioned a machine that could be used like an appliance. It would be cheap, easy to use, and self-contained.

Raskin began the Macintosh research project in September 1979. The Macintosh he envisioned would cost less than $500 and be so easy to use that manuals would truly be irrelevant. It would also be portable and run for up to two hours on battery power.

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By the time Raskin resigned from Apple in 1982 over differences with **Steve Jobs**, the Macintosh project looked much more like a scaled-down **Lisa**, and much more like the Macintosh that was eventually released.

After leaving Apple, Raskin became a writer and consultant. In March 1987, he was presented with a Mac Plus designated as the one millionth Macintosh.

See Also
History; Jobs, Steve; Lisa; Macintosh

Raster Image Processor (RIP)

The RIP interprets **PostScript** data into very high-resolution bitmapped images (raster images). Because it must process huge amounts of complex data very quickly, it is a source of potential problems. All sorts of things can "choke up" a RIP, but improper and overly complicated graphics techniques are a common source of difficulty. For example, embedding an **EPS (Encapsulated PostScript)** graphic in another EPS graphic is definitely frowned upon by service bureaus (where RIPs most often reside). Many service bureaus and other service providers have electronic publication file guidelines they are happy to share with you. Raster image processor problems are usually addressed in these guidelines.

Raster image processors are either hardware or software, but hardware RIPs are favored because they are faster. Speed is a major concern in the economics of a service bureau because it affects how much data can be

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processed in a workday and therefore how many clients can be served.

See Also
Imagesetters; PostScript; Prepress; Printing Methods, Digital

Ray Dream's AddDepth
See
AddDepth

Ray Dream Designer/Studio

Ray Dream Designer/Studio is an easy-to-use, low-cost **3D modeling** program that has been marketed primarily to illustrators and other users with a non-3D background.

The original product, Ray Dream Designer, featured only modeling and **rendering** features. Ray Dream Designer 4.0 added a plug-in architecture that makes it possible to add features and effects. The first plug-in from Ray Dream Designer was an **animation** tool; the tool and Ray Dream Designer are sold as the Ray Dream Studio package.

The modeler in Ray Dream supports **lathing** and **extrusion**, and you can create multiple cross-sections of an extrusion, as well as adjust the shape along which the extrusion is made (it's effectively a **sweep** tool). 2D surfaces

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are drawn using a **Bézier** pen tool, but after the shape has been created, you cannot edit the individual surfaces—you can only go back and edit the basic cross sections and paths in the models.

Surfaces and libraries of models are accessed from separate windows. Surfaces are dragged from the surface window onto the surface of models. Ray Dream also supports **rotoscoping** (applying **QuickTime** movies as a texture to an object).

Designer also has Wizard tools that help you quickly create basic shapes and scenes.

The new animation tool is surprisingly powerful, supporting such features as **inverse kinematics** and *point at* (which causes an object to always face another object as it is animated). Ray Dream offers some additional plug-in modules that include layered fog and additional cameras lenses (including a panoramic lens).

Fractal Design
Price: $499
Phone: (408) 688-5300
Web: http://www.fractal.com

See Also
3D; Modeling

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Ray Tracing
See
Rendering

Read Me Files

Read Me **files** are documents included with applications to give last minute information about the application, additional instructions, or a personal note from the developer. These files are usually in **TeachText** or **SimpleText** format, and it's not unusual for software developers to include either the TeachText or SimpleText application on the same disk in case the user doesn't have it.

Read Me files are very popular for **shareware** and **freeware** authors who distribute their products through **online services** or the **Internet** .

Because these files are transferred via phone lines, rather than by disk, they include Read Me files for their application instructions, credits, and if it's shareware, where to send the check. TeachText has been around since the Mac was introduced, it's automatically installed with your **System,** and it's included with most every application you buy. Shareware and freeware authors feel pretty confident you'll have a copy of TeachText or SimpleText on your **hard drive** and be able to read their Read Me files.

See Also

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Files; Freeware; Hard Drive; Internet; Online Services; Shareware; SimpleText; System; TeachText

Read-Only Memory (ROM)

See
Power Mac Logic Boards

Read/Write Heads

Read/write heads are responsible for transferring data (writing) to the computer's hard drive as well as retrieving (reading) the information that has been stored there. Read/write heads also make random data access possible, because they can move back and forth across the face of a disk while the disk is spinning. Data stored close to the center of a disk is, in practical terms, no further away from the read/write heads than data stored at the very edges of the platter.

See Also
Disks and Drives; Online Storage; RAM

RealAudio

RealAudio is a system with several parts:

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- A "file format" used to transfer sound files over the **Internet** in real time.
- Commercial software to create and serve RealAudio content.
- Free client software that receives and plays RealAudio content.

As CPUs and **network** connections increase in speed and **bandwidth**, it becomes more feasible to transfer video and audio files over networks such as the **Internet**. RealAudio (the company) has advanced this technology to the point that users of RealAudio 1.0 could receive low-quality audio over 14,400-baud **modem** connections.

RealAudio files don't contain the actual sounds[em]rather, the audio data is "**streamed**" from the server machine to the client machine. The streamed data is compressed by the server and decompressed by a RealAudio player or **plug-in** application on the user's computer. This approach avoids time-consuming writes to the client's disk and massive sound files, albeit with an unmistakeable effect on sound quality.

RealAudio allows users to receive content that it just isn't practical to deliver in **AIFF**/U-law/**MPEG** format—large files like the complete soundtrack to *Plan 9 from Outer Space*, which would take days to download and dozens or hundreds of megabytes to store.

RealAudio's sound quality suffers as a result. It's often compared to AM radio.

In 1995, when RealAudio was released, the format was used primarily in

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conjunction with the World Wide Web. It's possible that RealAudio might develop a usefulness outside the context of the Web, as a sort of Internet radio. Given the popular success of the Web, however, it's likely that RealAudio will continue to be used as a soundtrack.

If you have a 28.8 modem or better, be sure to download the RealAudio 2.0 **client** package, which can includes a Netscape Navigator plug-in If you've got a 14.4 modem or slower, you can use the RealAudio 1.0 client. Both versions of the software install all of the necessary components automatically. Version 1.0 even configures Netscape to use RealAudio as a helper application.

You can download the RealAudio client software, and get more information about the "studio" and **server** software at http://www.RealAudio.com.

See Also
AIFF; Bandwidth; Client/Server; Internet; Modem; MPEG; Netscape Navigator; Network; Plug-Ins; Streaming

Rebel Assault II: The Hidden Empire

Rebel Assault II, a Star Wars based game, gives you the chance to man the helm of such famed vessels as the Millennium Falcon and an Imperial Tie-Fighter. Rebel II is visually astounding, employing 3D graphics, animation and live actors.

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As in other LucasArts products, the images are flawlessly mixed into an action-packed scenario. Each mode gives you the chance to play an entirely different sort of game, including one reminiscent of Dark Forces, sticking you into on-the-ground combat, minus a protective vehicle, in the tradition of a **First-Person Perspective Shooter** . Rebel Assault II, with its special effects, many-tiered plots and varied missions, is a breathtaking experience that should prove challenging enough for **flight sim** pros while still appealing to a more general, less flight-sim experienced audience.

See Also
Absolute Zero; Sim Games; Wing Commander III

Reboot

Reboot is a computer jargon synonym for the word **restart** . To reboot your computer is to restart your computer. If, for example, you're using your computer and need to restart, you'll often **restarting** referred to as **rebooting** . Reboot and restart mean the same thing.

See Also
Boot; Reboot; Restart

Rebuild Desktop (Keyboard Shortcut)

To **rebuild the desktop** file on your Macintosh, press the Option-⌘ keys

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just before the **desktop** appears when **starting up** your Mac. The desktop appears after the last extension or control panel loads into your system (you can watch their icons load at the bottom of your screen during startup), and just before the desktop appears the startup screen disappears. Holding down Option-⌘ just before the desktop appears brings up an **alert box** asking if you want to rebuild the desktop on your startup disk. If you want to rebuild the desktop of the disk, click OK in the dialog box. After rebuilding your **startup disk** , it then asks if you want to rebuild the desktop(s) of other mounted volume(s). To rebuild the desktop on other mounted volumes, **click** OK in the dialog box, and the desktop on the named disk is rebuilt.

 See Also
Alert Box; Click; Default Button; Desktop; Desktop File; Enter Key; Keyboard Shortcuts; Rebuild Desktop; Return Key; Startup, Startup Disk

Rebuilding the Desktop

Each disk has invisible files called he desktop files (the desktop BD and desktop DF) that keep track of which files are on the disk, which files have been deleted, which **icon** belongs with which file, and a host of other important file-tracking duties.

As hundreds of files are moved on and off your hard drive, the desktop file can get pretty large and become corrupt. If you let it go on long enough, you may start to have problems with icons disappearing, and, eventually, the

files disappearing. To prevent this, you should rebuild the desktop every so often, which replaces the old desktop file with a new one. How often you should rebuild this desktop file is a subject of debate, but many users rebuild theirs once a month just to be on the safe side. Of course, if you're experiencing problems with icons disappearing or other symptoms (listed previously), you should rebuild your desktop immediately.

To rebuild the desktop, **restart** your Mac and hold down the Option and Command keys just before the **Desktop** is displayed. You get a **dialog box** asking, "Are you sure you want to rebuild the desktop file on the disk (your hard drive's name appears here)? Comments in info windows will be lost." (The loss of comments in the Get Info Windows was fixed in System 7.5.3.) To rebuild your desktop, click OK. The comments are the personal comments, if any, you added to the **Get Info** window of a file. If you haven't left any comments, this is irrelevant to you. Click OK. A **status bar** appears with a gray bar progressing from left to right to show you that the rebuild is in progress. When complete, you are returned to the Finder.

How do you know when it's time to rebuild the desktop? One warning sign is when your icons start to change to the generic icons. If you look at your Microsoft Word application icon, for example, the custom, full-color icon is replaced by a black-and-white icon of a diamond-shaped box with a hand holding a pen on it. This is a classic warning sign of a corrupt desktop file—time to rebuild. Rebuilding takes only a few minutes (the bigger your drive, the longer it takes) and many people do it once a month whether it needs it or not. It's good practice to get in the habit of doing it monthly. This

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helps ensure that your desktop file is always in good repair. Also, some experts recommend that you rebuild your desktop after a crash just to be safe.

To rebuild the desktop, follow these steps:

1. Restart your Macintosh.

2. Hold down the Option-⌘ keys just before you see the desktop.

3. A dialog box asks you if you're sure you want to rebuild the desktop.

4. Click OK.

5. After the desktop has been rebuilt, you'll be prompted to see if you want to rebuild the desktop on any other mounted disks (including floppy disks.)

See Also
Command Key; Desktop; Desktop File; Dialog Box; Finder; Get Info; Hard Drive; Icons; Option Key; Restart; Status Bar

Rebuilding the Desktop on a Disk

Just as your hard disk's desktop can grow, so can the invisible desktop file on a disk. In fact, it's not unusual to see a **disk** showing it has "zero" items on the disk, but it has 200-300K on the disk. That is the desktop file. To get this desktop file back down to its original size (just 1K), you rebuild the disk's

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desktop. There are a number of ways to accomplish this.

1. Hold down the Command-Option keys while inserting a disk into the disk drive. This brings up the standard "Do you want to rebuild the desktop on the selected disk?" dialog box. Click OK to **rebuild the desktop** on the disk.

2. You can also rebuild the desktop on a disk already mounted on the desktop by doing a force quit (Option-Command-Esc) at the Finder. When the Finder starts its force quit, hold the Option-Command keys before the desktop appears and you'll get the standard "Do you want to rebuild the desktop on the selected disk?" dialog box. The drawback here is this dialog box appears for all mounted disks, so you have to click Cancel for any disks that you don't want rebuilt.

3. Probably the quickest and easiest way to rebuild the desktop of a disk comes via the shareware utility DiskSweeper by Jim Speth. Drag the icon of a disk onto DiskSweeper's icon, and in a few seconds the desktop is rebuilt and back down to 1K. You can find DiskSweeper on most online services and on the Internet.

If you want to erase disks as soon as you insert them, hold down the Command-Option-Tab keys as you insert the disk. You immediately see the dialog box asking whether you want to erase the disk.

See Also
Disks; Rebuilding the Desktop

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Red Book Audio

Red Book Audio refers to standard CD audio files. Most audio CDs conform to this standard. A disc that uses this standard usually has the disc logo with "digital audio" written below it. CD audio is stereo 16-bits, sampled at 44.1KHz **sampling** rate.

The term *Red Book* refers to the color of the book containing the specification for the CD audio discs.

The Apple CD Audio Player desk accessory can be used to play CD audio disc, although it does not access the files directly. If you have an internal CD player, you can listen to the CD through the Macintosh sound hardware, if you have an external CD player, you must use headphones to hear the audio or use a cable to connect the output of the CD to external speakers.

The Macintosh file system recognizes CD audio thanks to a **Foreign File Access** Extension plug-in called **Audio CD Access**. This enables the Macintosh to read CD audio files and convert them to a format that other applications can use. The CD files are converted to a **QuickTime** movie, and can be played from any application that supports QuickTime. Or, after they are converted to QuickTime, using a QuickTime editor such as Adobe Premiere, the movie can be converted to AIFF format. Converting CD Audio files to QuickTime or AIFF format can be useful in multimedia authoring. Most applications, such as Director and HyperCard, cannot play CD audio from the CD disc. Remember that most CD audio discs are protected by copyright law.

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Redo Command

Recent Applications folder

This is option for the **Apple menu** that creates a folder in the Apple menu and keeps track of the last applications you've used and enables you to choose those applications from the Apple menu. You might use this time-saver in a situation where you used an application earlier in the day and need to use it again. Rather than searching around your drive, and digging through folders to find the application, you can just pull down the Apple menu, look in the Recent Applications folder, and just relaunch it from there. It appears there because you used it recently. You can set the number of applications you like remembered in this dialog. If you only want it to remember the last three you used, you can set the preference to three in the Apple Menu Options Control Panel.

To enable the Recent Applications folder, follow these steps

1. Choose Apple Menu Options from your Control Panel folder.

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2. Click: Remember Recently Used Items, then under the area marked Recent Items: Applications, simply enter the number for how many recent used applications you want to have available to you in the Recent Applications folder.

3. When you've entered the number, close the options Control Panel and the recent applications folder will now appear in the Apple menu tracking, and making available your recent applications.

See Also
Aliases; Apple Menu; Apple Menu Options; Control Panel Folder

Recent Documents folder

This is option for the **Apple menu** that creates a folder in the Apple menu and keeps track of the most recent documents you've opened and enables you to choose those documents from the Apple menu. You might use this time-saver in a situation where you worked on a document earlier in the day and need to use it again. Rather than searching around your drive, and digging through folders to find the document, you can just pull down the Apple menu, look in the Recent Documents folder, and just relaunch it from there. It appears there because you used it recently. You can set the number of documents you like remembered in this dialog. If you only want it to remember the last six documents you used, you can set the preference to three in the **Apple Menu Options Control Panel.**

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To enable the Recent Documents folder, follow these steps

1. Double-click the Apple Menu Options Control Panel, located within the Control Panels folder within your System Folder.

2. Click: Remember Recently Used Items, then under the area marked Recent Items: Documents, simply enter the number for how many recent documents you want to have available to you in the Recent Documents folder.

3. When you've entered the number, close the options Control Panel and the recent documents folder will now appear in the Apple menu tracking, and making available your recent documents.

See Also
Aliases; Apple Menu; Apple Menu Items Options; Control Panel Folder

Recent Servers Folder

This is option for the **Apple menu** that creates a folder in the Apple menu and keeps track of the most recent servers you've been connected to and enables you to choose those **servers** again from the Apple menu. You might use this time-saver in a situation where you worked on a server earlier in the day and need to access it again. Rather than finding the server and signing on again, now you can just pull down the Apple menu, look in the Recent Servers folder, and access that server directly from there. It appears

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there because you used it recently. You can set the number of servers you like remembered in this dialog. If you only want it to remember the last three servers you used, you can set the preference to three in the **Apple Menu Options Control Panel.**

To enable the Recent Servers folder, follow these steps

1. Double-click the Apple Menu Options Control Panel, located within the Control Panels folder within your System Folder.

2. Click: Remember Recently Used Items, then under the area marked Recent Items: Servers, simply enter the number for how many recently used servers you want to have available to you in the Recent Servers folder.

3. When you've entered the number, close the options Control Panel and the Recent Servers folder will now appear in the Apple menu tracking, and making available to you a list of servers you used most recently.

See Also
Apple Menu; Apple Menu Options; Control Panels; Servers

Recompression

Applying a new compressor to a **QuickTime** clip that has already been compressed. Often, video is captured using either no **compression** , or using

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the Component Video compressor. Neither of these are appropriate for distributing the movie to others because of the size of the files. During the editing phase the movie is recompressed using Cinepak or some other compressor.

Sometimes, clips are compressed using one compressor, and then have to be recompressed either with a different setting, or with a different compressor. If at all possible, this should be done with the original clips, rather than recompressing the movie that has already been compressed. Using compression routines on a clip multiple times results in much poorer image quality due to the combined effects of the compression algorithm.

See Also
Compression; Digitizing Video; None; QuickTime

Record
See
Structure

Reference Materials and Directories
The CD-ROM is ideal for all kinds of reference materials, including directories and other searchable databases. A single CD-ROM can hold a lot of data, up to 650MB, which is quite a mouthful.

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Publishers eager to put all that space to good use have brought out reference discs of everything from the *StarTrek Interactive Technical Manual* to the ultimate phone book, *70 Million US Households*. Naturally, the quality and validity of the information varies. Users report that some of the 70 million families have moved or changed their phone numbers, and a companion volume, *11 Million US Businesses*, has similar inaccuracies. On the other hand, the *Phone Disc PowerFinder 96* series has gotten excellent reviews from many sources, as has the **ProPhone** series.

If you need to find out where the people or businesses you're looking up are located, try **StreetAtlas, USA** from DeLorme Mapping. There are twelve million streets on this disc, giving you a detailed map of all fifty states that also includes lakes, ponds, rivers, railroads, and other landmarks. You may never get lost again.

You can find just about any topic you can name on a CD-ROM. There are reference guides to cooking, sex, history, science, the arts, and so on. *Digital Beethoven* introduces you to 44 classical composers and a CyberOrchestra. *Everything Weather*, produced by the Weather Channel, has a database of typical weather around the world. Use it to decide what to pack for your next vacation. You can also check out the QuickTime clips on the century's wildest storms. *4 Paws of Crab* is a delightfully quirky look at the culture and cooking of Thailand. Stephen Hawking's *Brief History of Time* is a classic "must have," whether or not you understand astrophysics.

Along with the text of the book, it includes a biography of the amazing Dr.

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Hawking and a clip of his appearance on StarTrek: The Next Generation. *Cinemania* is an interactive movie guide, with reviews by such luminaries as Roger Ebert and Leonard Maltin.

Health care professionals and medical students will be delighted with the series of anatomy guides from Gold Standard Multimedia. They include *Human Anatomy*, with 6000 photographic images of cadaver specimens, plus the fundamentals of gross anatomy and dissection techniques. *Radiologic Anatomy* includes X ray, MRI, CT, angiography, fluoroscopy, and contrast studies. *Microscopic Anatomy* offers a logical organization of 1200 histologic slides and electron microphotographs.

You also can zoom to full screen enlargement of any slide. Gold Standard Multimedia also produced *Clinical Pharmacology*, the equivalent of a 7,000+ page guide to prescription and non-prescription drugs, including patient-specific reports and much more.

To find out what's available in your field, check your newsstand for a copy of the *Macintosh Multimedia & Product Registry*, published quarterly by Redgate. It lists over 8,000 pieces of hardware and software specifically for Mac and Power Mac, including approximately 2,000 CD-ROM titles.

Referencing

Most desktop publishing projects involve combining more than one kind of document into one file: Word processing documents and graphics files are brought together in a page layout package to create a final design.

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There are two ways to combine such files. First, as almost always happens with text, information from one file can be copied into another. This can also be done with graphics. Under this system, all information is contained in the final file, which can end up being very large. The original graphics files are no longer needed to view or print the final combined document.

The other method is referencing, by which the original graphic or text file is "referred to" when the combined document is viewed or printed. All the referenced files must remain together with the final document.

See Also
Publish-and-Subscribe

Reflection and Reflection Maps

Related to **texture mapping** and **shaders**, reflection defines the surface reflectivity of a **3D** object.

Reflection maps can be used to specify what is reflected in an object (for example, an image file could be reflected in the surface of a mirrored ball), saving you the trouble of actually creating the objects that you want reflected in the ball. Most programs support reflectivity, and some support reflection maps.

See Also
Rendering

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Reflectivity
See
Reflection Maps

Reflector
A machine with a **TCP/IP** connection to the **Internet** that has been set up to multicast, or distribute, video and audio signals to one or more sites using software such as **CU-SeeMe** . Without a reflector only two participants can have a conference using CU-SeeMe software. A CU-SeeMe user can connect to a reflector site and distribute video over the **World Wide Web** . Users are asked to notify the contact person for each reflector before multicasting, and to minimize connection time.

See Also
CU-SeeMe; World Wide Web

Refresh Rate
See
Monitors, Image Quality

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Registration Card

Keeping up with new versions of software starts with filling out the registration card, usually a little piece of cardboard resembling those in most other consumer products like TVs, radios, vacuum cleaners, and toasters. Increasingly, however, software companies are including interactive registration options with their software, invoked either when you install the software or when you launch it. (The software continues to ask you to register until you either register or configure it to no longer ask you that question.)

Registered owners have several advantages. For example, many companies will automatically send free copies of upgrades to registered owners. They will also mail discount offers for newer versions to registered owners.

The major drawback to registering your software is that you will now receive extra, possibly unwanted, mail concerning the company's other products.

See Also
Software Upgrades

Relative Motion
See
Absolute Versus Relative Motion

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Relative Path

A relative path is a way of describing the location of a document or object on the **Internet** so that it can be accessed by means of a **hypertext link** .

A pathname is part of the A HREF or **hypertext** reference in **HTML** that leads to the document or object. An relative path, in contract to an **absolute path** , points to a destination file by describing its relation to the originating document.

The directories that a **Web browser** has to go through to reach the destination document are separated by **slashes** . Two dots ("..") indicate the folder above the current one. For example, if the document is in the same folder as the originating document, you need to enter only the following HTML:

<A HREF="document.html">

If the document is located in a folder called "files", which is located in the current folder:

<A HREF="book/document.html">

If the document is one folder up from the current directory:

<A HREF="../document.html">

Relative path names are generally preferred to absolute path names because absolute path names are not portable. If the **Webmaster** of a **Web site**

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moves any of the documents linked with absolute path names to other documents, all of the hypertext references will have to be changed to reflect the new location(s).

See Also
<A> Anchor Tag; Absolute Path; HTML; Internet; URL; Webmaster; Web Site; World Wide Web

Remote Access
See
Apple Remote Access

Remote Access Server
See
Servers/Remote Access

Remote Shutdown
Using a **shareware** utility called Remote Shutdown, you can **shutdown** or **restart** any Mac on a **network** from another Mac on the same network. The capability for one Mac to control the actions or **commands** of another is called **program linking** . It is available on **System 7** and higher and is

activated through the **Sharing Setup** Control Panel by **clicking** the Start button on Program Linking. You also need to activate Program Linking in the **Users and Groups** Control Panel on the User Options **dialog box.** Click the **check box** for Program Linking.

See Also
Check Box; Click; Command; Dialog Box; Network; Program Linking; Users and Groups; Restart; Shareware; Sharing Setup; Shutdown

Remote Shutdown Utility

Using Remote Shutdown, a **shareware** utility, you can **shutdown** or **restart** any Mac on a **network** from another Mac on the same network. This capability for one Mac to control the actions or **commands** of another is called **program linking**. Program linking is only available in System 7 and higher and is activated through the **Sharing Setup** Control Panel by **clicking** the Start button under Program Linking. You also need to activate Program Linking in the Users and Groups Control Panel in the User Options **dialog box** by clicking the **checkbox** for Program Linking.

See Also
Checkbox; Click; Command; Dialog Box; Network; Program Linking; Restart; Shareware; Sharing Setup; Shutdown; Users and Groups

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Removing Items

See

Permanently Removing Items from the Macintosh

If you installed a software program, **extension**, or **control panel** by **dragging** it from a **disk** to your **hard disk**, you can permanently remove the item by dragging it into the **trash can** at the **desktop** and choosing **Empty Trash** from the **Special menu**. However, if you used an **installer utility** to install the application or extension, these installers often install invisible files or alter system resources that cannot be seen. In this case, you need to use the original installer utility and perform a uninstall, which removes the selected program or extension and removes any invisible files or other actions performed during the original install. This uninstall feature is not available for all applications.

To perform an uninstall, insert the disk with the Install program on it and launch the installer. Click the "Custom Install" button. Hold the Option key and this will change the Install button to the Remove button, which enables you to uninstall, or remove, an installed program and any accompanying files that were installed.

To uninstall, or remove, an installed application, follow these steps:

1. Launch the installer program for the application.

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2.   Click the Custom Install button

3.   Hold the option key and the Install button changes to the Remove button.

4.   Click Remove to uninstall the application and any accompanying files that were installed.

See Also
Control Panel; Copying Files; Desktop; Disk; Empty Trash; Extension; Hard Disk; Installer Utility; Special Menu; Trash

Renaming Files Without Using the Mouse

You can find a specific file and rename it without ever touching the **mouse**, provided you are in the right folder:

1.   To locate the file you want to rename, type the first few letters of the filename to jump right to it.

2.   If you have a number of files whose first few letters are the same, use the arrow keys on the keyboard to move quickly to the file you're looking for.

3.   When you find it, rename the file by pressing Return or the Enter key to highlight the **filename**. Enter the new name for the file and press Return or Enter again.

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4. If you make a mistake while typing or change your mind before you're finished, before you press Return or Enter, press Command-Z, which undoes your changes.

See Also
Mouse; Naming a File

Rendering Farm
See
Network Rendering

RenderMan
See
MacRenderMan

Repairing Your Mac
Troubleshooting is the process of discovering what's wrong, why it's wrong, and how to fix it. It is important to think logically and clearly about the problem, eliminate what variables you can, and systematically work to a solution. Some of the things to check for hardware problems include: are cables fully seated in their connectors; are there sharp bends (indicating a

possible broken wire) in cords and cables; and do you hear the hard disk spin up when you start your Mac?

You will begin the hunt by narrowing the search to the three main components of any computer system: the hardware, the software, and the user. Some problems can be caused by a combination of hardware and software, as is the case when faulty hardware causes the software to malfunction. But before you dig into the technicalities of hardware and software, it's best to start with the user because user-caused problems are the easiest to discover and fix.

There is an old story about a user who complained to his company's computer department that the new Mac installed on his desk wasn't working. When asked what exactly the problem was, the user replied that the machine wouldn't turn on, even when he pressed the foot pedal. It soon became apparent to the problem solver that the user had no idea what the Mac's mouse was used for.

While few users are as computer-naive as this one, there is a moral to this story that can be applied to everyday problem solving: don't assume the user knows what he is talking about. This applies even if the user is you—you could be staring the problem right in the face and not realize it, so be careful about your assumptions. Ask yourself if there is a real problem. For example, what seems like a frozen or crashed screen may simply be a task that is taking a long time to complete, as may be the case during network access.

Whether you are the user or the problem solver, it's important to be very

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clear about terminology when communicating with another person. If you are working by yourself, verify terminology with a manual or reference book.

There are a few places the user could have gone wrong. This includes using software incorrectly, forgetting to turn hardware or software features on, and accidentally deleting related files, such as extensions and preference files. A good place to start to look for a user problem is with settings in a control panel or the preference command in application software. A user may not be aware of all the settings on the Mac hardware or software, or even that there are areas that allow you to change the setting. Also, consider the possibility that someone else could have used the Mac and changed a setting while the user was away.

Software is the most common location of Mac problems; there are many ways for things to go wrong with software. Brand new software can come with problems built right in. Bugs, or errors, in the code, are not uncommon, and are usually fixed with a minor upgrade. Software installed on your hard drive can become damaged due to random fluctuations in magnetic fields near your hard drive, or due to a computer virus. A sector on a hard drive can go bad, taking a vital piece of your application or system software with it. Software can also be incompatible with other programs on your Mac, so that problems show up only when two or more specific pieces of software are running at the same time.

You can look for specific indications that your problem is based in software

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rather than hardware. Problems such as applications unexpectedly quitting or crashing are usually based in software. If you are getting error messages while in an application, your problem is most likely software-based. Other problems, such as those related to networks or peripherals, could be either hardware or software.

One of the most common sources of problems is System software, particularly extension files (called INITS in System 6) and control panels. Extension files are small programs that load into memory during startup, and are always running in the background. Control panels are similar to extensions, except that they allow you to change settings that control hardware and software. Incompatibilities can occur when two or more extensions or control panels claim the same areas in memory. This can cause repeatable or random problems, including frozen screens and system crashes. There are usually no incompatibilities with Apple System software; the problems occur with extensions and control panels from other companies or individuals.

Application-based problems are also possible. An application may not function properly if it doesn't have enough memory allocated to it, particularly if you are working with large files. Some applications will let you know that they need more memory, whereas others will perform slowly, quit, or even crash. You can increase the memory allotted to an application by selecting the application icon in the Finder and selecting Get Info in the Finder's File menu (⌘+I).

Reinstalling System and application software using the original installation

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floppies can often clear up problems. Other times, you may just have to remove the problem software if it contains bugs or conflicts with other software.

Hardware problems tend to be easier to locate than software problems, but are often more costly to fix. Typical hardware problems include Macs and peripherals that have malfunctioning subsystems as well as cables that are damaged or just slightly disconnected. The offending subsystems can include a RAM SIMM, a power supply, a nonfunctioning keyboard, and hard drives. Disk drive problems are particularly worrisome because they can cause you to lose your data. Unfortunately, drive problems are not uncommon, which is why you should make frequent backups of your data. This is particularly true for PowerBooks that are carried around a lot—they are prone to disk drive problems.

A totally dead Mac almost always has hardware at the root of the problem. If the Mac does turn on, hardware problems can prevent your Mac from booting. If you don't see the Happy Mac icon at the beginning of the startup procedure, you will get one of several other icons. A Sad Mac icon and the Sad Mac musical chord often indicate a hardware problem, including RAM or startup disk problems. A disk icon with a question mark means the Mac could not find a boot disk, indicating a problem with the disk hardware or cables, or System software. A disk icon with an X means that the Mac found a startup disk, but the disk or System software is damaged.

One way to uncover the exact cause of a problem is to find out what is *not*

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causing the problem by removing or disabling the item, or otherwise proving that it is functioning correctly. Other suspects can be eliminated from consideration because they have an alibi—they were turned off, not in use, or busy doing something else. It's a good idea to take a survey of control panel settings and the state of hardware (on or off) before beginning a lengthy program of elimination.

Process of Elimination   The process of elimination often starts with extension files and control panels. First, you will want to turn all of these files off at the same time to see if the problem disappears. You can do this while holding the Shift key down after you restart. If the problem is still there, you've eliminated all extensions and control panels from consideration. If the problem has disappeared, you've narrowed your search to this class of files.

To eliminate individual extension files and control panels from the suspect list, remove them one at a time from the System folder, or turn them off one by one with an extensions manager utility such as Apple Extensions Manager. After disabling a file, restart the Mac and try to reproduce the problem. If the problem is still there, the file is probably not guilty. (We say *probably* because sometimes a combination of three extension files will cause a problem when any two will work fine.) Repeat this until the problem disappears, and you've found your incompatible file.

If you have several dozen control extensions loading at startup, you may be able to speed up this process of elimination by removing half of the

extensions and control panels and restarting. If the problem is still there, remove the remaining one-half of the files and restart. When the problem disappears, you've discovered the culprit file is in the last batch you removed. Replace half of the last batch you removed and restart. Keep doing this until you find your bad file. With this method, you'll need to keep close track of which files you've eliminated, but it can be faster than removing one file at a time.

If you determine that the extensions and control panels are not causing the problems, you may want to consider other files in the System folder, such as the Finder and System files. Unlike extensions, these files can't be removed because the Mac requires them for normal operation. However, you can replace them with fresh copies. Always make a backup of your System file before replacing it, because you may want to reinstall it if something goes wrong. Although the Finder can be replaced by a simple drag-and-drop, you should use an Apple System disk and Installer program to replace your System file; otherwise, sounds or fonts stored inside the file can be lost (this is not a concern under System 7).

If reinstalling the System software doesn't clear up the problem, you may need to re-create your System file from scratch. In this case, remove the System and Finder files to a safe location, such as another disk and reinstall using the Installer application. *Never* put your System file in the Trash "for safe keeping," as you can lose it for good in the event of a crash. Keep your old System file on a separate disk until you have all your software reinstalled and working correctly.

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If you suspect an application, you can use the process of elimination to make sure that the malfunction doesn't occur in other applications. After you've determined that it is indeed a single application that has a problem, you can try reinstalling it to correct for corrupted code. You can also try turning features off one at a time in a preferences box to isolate the problem to a specific task and identify a bug.

The process of elimination also works with hardware. You can prove that major components (such as hard drives, monitors, RAM SIMMs, expansion cards, and cables) are working by replacing them with parts that you know are working, or by trying them in another Macintosh. You may be able to narrow down the problem to one of the Mac's ports, all of which reside on the logic board. For problems on the logic board, the best you can usually do is to narrow down the search to a functional group. For example, if you've determined that your ADB cable and keyboard are working by trying them on another Mac, you can conclude that the ADB circuitry on the logic board is malfunctioning. However, it is impractical to determine which chips on the board are causing the problem.

After you have isolated a candidate culprit, either hardware or software, try to reproduce the problem by returning the suspect to its original configuration. If the problem reoccurs, you have been successful. However, some problems act randomly. In this case, you will have to use your Mac for a longer period of time with and without the suspect software or hardware to see if the problem reoccurs.

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Isolation by Positive Symptoms   Positive symptoms make it easy to identify the problem but often indicate a severe or fatal problem. A positive symptom includes smoke from a piece of hardware, or a loud noise from systems with moving parts, such as disk drives and printers. Bent, broken, or corroded components on the logic board, expansion cards, and connectors are other symptoms to look for. Excessive heat is another. (Be sure to shut off and unplug the Mac before touching internal parts.) Many parts are normally warm when operating—85 degrees Centigrade is not unusual for electronic components—but you should be able to touch them for a few seconds without getting burned. If a hard drive is very hot, there is a good chance it is dead.

Software can also exhibit positive symptoms. An example of this would be a problem (such as crashing or freezing of the screen) that regularly occurs when you activate a certain feature or hit a certain key combination.

Totally Dead   One of the most frustrating problems you can encounter occurs when you press the start button on your Mac and nothing happens. Sometimes everything isn't dead, just a major component. Sometimes everything is dead. In either case, you have a hardware problem. "That's nice," you may say, "but how can I eliminate suspects if nothing works and there isn't any smoke or flames?" The answer is to look at each of the few systems that could be preventing your Mac from working. Start with the indicator lights.

No Power LED   LED indicator lights are found on your Mac, on external hard drives, modems, printers, and other peripherals. If the indicator is not

lighting, it is possible that the LED itself is the problem, but it is not very likely. LEDs use very little power and are almost immortal. You can open up the case to see if the wire connecting the LED to the logic board is still plugged in. This is easy to do with most Macs, but not so easy with an external hard drive. Unless you've been messing around inside the box, a loose LED wire is not likely to be the problem, either. You should check the following items:

- Is the device turned on?

  This sounds like a dumb question, and actually, it is a dumb question, but the only thing checking can hurt is your pride. Check the power switch of the Mac and all hard drives or other devices on the SCSI chain. If the Mac is plugged into a power strip, make sure that the strip is turned on as well.

  Some Quadras and Apple Workgroup Servers have power keys. Make sure that the key is inserted and turned to the on ("1") position.

  Occasionally, the keyboard power-on switch may not be functioning. Try unplugging the keyboard and restarting with the power-on switch on the back of the Mac.

- Is your Mac receiving external power?

  Make sure that your Mac is getting power from the AC outlet it is plugged into by plugging something into it. A radio is good because you hear when it's on and don't have to be looking at it while you

fiddle with circuit breakers. If the AC outlet checks out okay, plug your test device into any power strips your Mac may be plugged into.

If your radio remains silent, check the fuses and circuit breakers in the power chain. If you're at home, you may have blown a house fuse or tripped a circuit breaker, or an office circuit may have become overloaded. (Your room's lights may be on a separate circuit.) Power strips sometimes have fuses of their own to protect against power surges, so check those as well. Also check peripherals for built-in fuses or circuit breakers.

- Is your Mac's power supply okay?

  If the external power checks out okay, the problem may be with internal power, the power supply. A power supply in a Mac or peripheral takes high-voltage (100 to 250 volts) AC power and turns it into several lower DC voltages that the various circuits can use. Power supplies are analog devices, full of big capacitors and resistors, rather than digital chips, which can burn out with age.

  Older Mac models (before the SE) are notoriously prone to power supply problems due to lack of cooling fans and to capacitors that have low heat tolerances. However, power supplies can go south in any Mac or peripheral. You can damage a power supply by plugging your Mac into an AC outlet that is not properly grounded. Plugging your three-pronged plug into a two-pronged outlet by using a converter plug can also damage the Mac's power supply, unless you ground the converter

plug to a pipe or other true ground source. A power surge in the AC line can also damage your Mac's power supply, which is why a surge protector is a good idea.

If you have a bad power supply, you may have experienced a shrinking screen in the days or weeks before your Mac went dead. A shrinking screen is a sign that the monitor isn't getting the power it needs. CD-ROM drives with faltering power supplies may not read CD-ROM discs properly, and may not read audio discs at all.

If your Mac isn't working, try replacing the power supply with one you know works from another Mac of the same model. Although it is difficult to remove the power supply in older Macs (such as the Plus, SE, and SE/30), it is a snap in other models, such as the IIci and some Quadra models.

Nothing on the Screen   If the LED indicators do light up and you hear startup sounds but nothing appears on the screen, the Mac is probably on, and its power supply is okay. Once again, it's good to start with a dumb question.

•   Is the monitor on?

    The monitor isn't something most of us are used to turning off, so it's often overlooked. However, some users, to conserve energy, will turn the monitor off while leaving the Mac on for network access. The power switch on most monitors is usually at the back.

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Is the monitor plugged in? Remember, there are two cables that need to be plugged in: the power and the video. The power cable is usually plugged into the back of the Mac, but it doesn't have to be. It could be plugged into another power source such as a power strip or the back of an external hard drive, which may not be turned on.

Are the contrast and brightness turned all the way down? Check these knobs by turning them all the way through from one extreme position to the opposite position.

• Are the cables OK?

Check to see that the cables are fully seated on both the monitor and the Mac. However, like all cables, monitor cables can go bad. With frequent bending, a wire can break on the inside of the cable, or come loose from the connector. The best way to identify a bad cable is to switch it with another cable on another Mac. If the cable is bad, throw it away. Troubleshooting and fixing a cable can be done, but it is not worth the time and will result in a cable of questionable reliability.

Check for bent pins on the cable. Pins can bend if someone has forced the cable into the Mac's port. You can straighten bent pins with needle-nose pliers, but be careful not to break the pins.

No Sounds A Mac is not a full Mac without sound. If you get your Mac to start up and display successfully, but the Mac falls silent, check for these areas:

• Startup Sounds

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If there are no startup sounds, check to see if you have headphones or other cables plugged into the sound out port. A cable in this port will disable all sounds. If you have an AV Mac, check to see if the cards are seated, or if cables are plugged into the sound out ports on the AV card.

If the sound port and AV cards are okay, open the Mac and check to see if the wire connecting the internal speaker to the logic board is plugged in on both ends.

• Volume Setting

If you do get startup sounds, but nothing after that, the volume setting in the Sound control panel is probably set to zero. If this is so, the menu bar will blink whenever a system beep is supposed to occur. This is a convenient setting for PowerBook users, who may be working on an airplane or in a library.

However, even with the Sound volume set to zero, you may hear some sounds faintly, such as a dialing modem.

If all else fails, try the following third-party utilities.

Repair Utility	*Developer*	*Contact Info*
Norton Disk Doctor		Symantec (part of Norton Utilities) 10201 Torre Ave, Cupertino, CA, 95104-2132, Phone (800) 441-7234. Web URL http:// www.symantec.com)

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DiskFix	Symantec (part of MacTool Pro package) 10201 Torre Ave, Cupertino, CA, 95104-2132, Phone (800) 441-7234. Web URL http:// www.symantec.com)
Disk First Aid	Apple Free, found on Disk Tools Disk.

See Also
Troubleshooting

Repeater
See
Hub

Reports, Custom
See
Forms and Reports, Custom

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Request to Send/Clear to Send (RTS/CTS)

See
Modem Cables and Connections

ResEdit

Depending on your perspective, ResEdit has a number of very different faces. If you're a programmer, ResEdit enables you to create resources, such as **dialog boxes**, **icons**, and **menus** for your own applications. If you're a power user, it's a nifty tool that enables you to customize your Mac in ways you can barely imagine. And if you're a beginning Macintosh user, it's a mysterious program you've heard mentioned in the same breath as grim warnings of potential catastrophe.

Of course, ResEdit is all of these things. Used carelessly, ResEdit can make applications completely unusable. But used with care, it can enable you to do some amazing things. Simply put, ResEdit enables you to create and edit **resource**s, bits of structured data stored in the resource forks of Macintosh files.

Why would a nonprogrammer want to edit resources? Because properly written Macintosh applications rely on resources for much of their human interface.

Using ResEdit, you can modify the text of any menu item (including its color

and style), add or change command keys, or even add new menu items. This last case, however, could be disastrous.

Applications normally know which menu item has been picked by that item's menu number. The menu number is a special identification number assigned to the menu as a whole, and the item number is the number of the item within the menu. So, for example, the New item in the previous figure would be identified as item 1 in menu 129. If you modify the resource by removing the New item, Open would now be item 1 in menu 129. As a result, choosing Open in the running application would create a new document window.

This leads to an important warning about ResEdit. Always work on a *copy*, not the original. If you somehow do irreparable damage to the file you're ResEditing, you can always revert to the original. Similarly, never edit a running application, including the System and Finder. This is one of the surest ways to confuse an application.

ResEdit is a great way to create or edit icons (see the following figure) and other visual resources, such as dialogs. The icon editor in ResEdit is not as full featured as a full-fledged paint program, but it does a great job of the basics.

With ResEdit you can edit either an application's resources or the resources of the Mac's system and **Finder** . By editing these resources, you can customize the appearance of your applications or the look of the Mac. This utility enables you to change the name of menu items, add commands to menus, or create **keyboard shortcuts** for **commands** that don't exist in the current application. You can edit the words in dialog boxes or message boxes,

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and you can choose from a host of resources to change to your liking. Each file's icon is stored within its resources, and you can use ResEdit to alter, or create your own new icons as ResEdit has its own icon editor and creation paint program built right in.

To use ResEdit, drag a copy of the file (remember: a copy of a file) whose resources you want to edit onto the ResEdit icon. (If you're using **System 6**, you'll have to launch ResEdit and choose the file manually.) When ResEdit opens a file, it displays icons that represent the various resources in that particular file, with a four-character code used by programmers to help identify which resource is which.

There are icons, for example, for menus, alert boxes, dialog boxes, windows, and so on. **Double-clicking** one of these icons takes you to another window listing all the editable resources for this item. Find the item you want to edit and double-click it. This brings up an edit window. These windows look slightly different from resource to resource as in one edit window you might be editing a menu, the next window might be editing an icon or a sound. After you've completed your edits, you can save the changes to the file, and those changes become permanent. If you decide you don't want to make these changes permanent, you can always choose **Revert** from the **File menu**, and the file will revert to the unaltered version you started from.

To edit a file's resources with ResEdit, follow these steps:

1. Make a copy of the file who's resources you want to edit.

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2. Drag the icon of copied file onto the ResEdit icon.

3. The file's editable resources open in a window displaying icons and Apple's four-character code for each resource. Double-click the resource type you want to edit. This brings up another window listing the available resources under that type. Double-click an item in the list to enter the edit window for that particular resource.

4. Each edit window is slightly different depending on the resource you're editing. After you've made your changes, select Save from the File menu to make these changes.

From a programmer's perspective, ResEdit is a capable resource editor, but is not the best in its class. That honor is reserved for **Resorcerer** , from Mathemaesthetics. In particular, ResEdit's capability to edit complex resources, using templates, is limited; some resources are especially difficult to edit using ResEdit, but a snap in Resorcerer. On the other hand, for many programmers, ResEdit is all they ever need.

ResEdit is available for free from Apple via its Web site:

http://www.apple.com/

or its areas on America Online and CompuServe.

See Also
Commands; Dialog Boxes; Double-Click; File Menu; Finder; Icons; Keyboard Shortcuts; Menus; Resorcerer; Resource; Resource Editing; Revert; System 6;

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Utility Program

Reset (Keyboard Shortcut)

On Macintosh **LC models** there is a keyboard shortcut for resetting (or **restarting**) the computer. You can use ⌘-Shift-**Power key** . The standard keyboard that Apple shipped with the LC models has a PowerOn key on the keyboard , but unfortunately you can't use this key to startup LC models. However, If you're using System 7.5 or higher, you can shutdown by pressing the PowerOn key. You are greeted with a dialog box asking if you're sure you want to shut down your computer, and you also have the option of restarting by clicking a restart button. You can also cancel if you press the PowerOn key by mistake while working.

See Also
Keyboard Shortcuts; LC Models; Power Key; Restart; Soft Boot; Startup

Residents' Bad Day on the Midway, the

Inscape's latest collaboration with graphic artist Jim Ludtke and the elusive musical group The Residents brings a whole new style of gaming to the interactive arena. Bad Day on the Midway is a **non-linear story** focusing on a series of bizarre murders taking place among carnival freaks.

Instead of answering questions and giving commands, Bad Day requires you

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to inhabit different characters minds as you wander the ground, piecing together the events and clues that lead up to solving the mystery. The trick is that certain characters have access to certain places and other people react differently to each of the different folk they meet. For example, if you are inhabiting the mind of the Dog Lady, you will learn different clues than if you are in the IRS man. The mix of 3D and 2D graphics in Bad Day on the Midway is the perfect complement to Ludtke's artistry and animation, also seen in The Residents' Gingerbread Man and The Residents' Freak Show. The homes and trailers of the carnival residents are full of multimedia treats and clues to the curious affliction that seems to be killing carnies off at an alarming rate.

Bad Day offers you the chance that no book can, a random point of entry to a story and the chance to wander through it. You learn the narrative as you go, in no particular order. Consequently, your experience can vary from play to play, making it a bit longer lasting than a book as well. Much like **hypertext fiction** , you can go through the story multiple times and experience a different series of events and encounters. The eerie feel, strange humor and incredible artwork weave well with this enticing and disturbing tale.

See Also
Adventure Games; Dark Eye, the; Hypertext Fiction; Non-Linear Storytelling Games

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Resize Box

See
Size Box

Resolution, Image, See Image Scanning, Resolution Measurement

Resolution Measurement

Two forms of resolution must be considered in digital graphics—image resolution and device resolution. Image resolution is measured in **pixels** (picture elements) per inch (ppi). High resolution in an image means that it appears more like a continuous-tone image. A **continuous-tone** image, like a photograph, does not appear to have individual picture elements. However, whether an image appears continuous or not depends on the viewing distance. Even photographic film has a grain which is somewhat analogous to pixels.

Device resolution reflects the ability of an imaging device to transfer the image resolution. This simply means that when an image is printed, its resolution in pixels must be translated into device resolution. Device resolution is measured in dots per inch (dpi). A certain number of pixels are needed to make a certain number of dots when the image is printed. This is known as the sampling ratio. Two types of dots are used in printing—**halftone** dots and **stochastic** dots. Digital halftone dots are

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composed of a cell of smaller spots made by the output device, and stochastic dots are a random arrangement of these same smaller spots.

See Also
Color Resolution; Digital Halftones; Dithering; Stochastic Screens

Resource

A resource is data of any kind stored in a structured format. That's pretty general—let's get a little more specific.

The designers of the MacOS realized that much of what a computer program uses are definable tidbits of data that can be stored in standard formats. The information required to draw a window, create a menu, or display a dialog box has constant elements. The data in those elements might vary depending upon what the window looks like, how the menu operates, or the contents of the dialog box; however, each of these items has certain features that can be defined and stored in a set format. Any data organized and stored in such a structured format can be a resource.

Each kind of resource has a particular assigned type. A resource type is a unique sequence of four characters. Apple Computer has defined many common resource types for Mac interface features, such as windows and menus. Examples of some common Macintosh resource types include:

• WIND—data that describes a window

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- MENU—data that describes a menu
- CODE—executable 68K code
- DLOG—dialogwindow data
- DITL—dialog item list
- ICON—a 32 x 32 pixel bitmap
- PICT—data that defines a picture
- snd —data that defines a sound (ends with a space)

Because a file can contain more than one of each type of resource, resources are also identified by an ID number in the range -32768 to 32767. Therefore, to fully identify a single resource, you must specify both a resource *type* and a resource *ID*.

One of the most important advantages of resources is that they can be accessed independently of a program's compiled code. In fact, 68K code is stored in resources of type "CODE."

Each file on the Macintosh consists of two parts, or *forks*: a data fork and a resource fork. The contents of each fork vary depending on the type of file. The following table summarizes how various kinds of files use the data and resource forks.

Fork Contents

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File Type	Data Fork	Resource Fork
Document	document data	document-related resources
68K Application	empty	resources & 68K code
Power Mac Application	code	resources
Fat Application	Power Mac code	resources and 68K code

Along with resource data, the resource fork contains a resource map that catalogs the resource type, ID number, name, attributes, and location of each resource in the resource fork. The map lets the resource manager (see next) know where each resource is located, so that each request for a resource does not involve a sequential search of the whole fork. When loaded into memory, the resource map also identifies which resources have been read into memory and where in memory they are located.

The resource manager provides a full set of routines to create, read, manipulate, delete, open, and close the resource fork of a file. The GetResource() routine, for example, takes a resource type and ID as input parameters and returns a **handle** to the resource data.

Resource Editor

Resources would provide little advantage if they had to be compiled into a program from the start and could not be edited separately. Thanks to the

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Mac's use of separate data and resource forks for each file, however, resources can be modified using a resource editor without affecting data or other resources in the file.

Two types of programs are available for creating resources: resource *editors*, which provide a friendly visual interface to edit resources, and resource *compilers*, which work much like any other compiler, converting a text description into actual resources. **ResEdit** and **Resorcerer** are in the first category, whereas **Rez** is in the second.

Although either type of program can be used to create any type of resource (with a few exceptions), many programmers use a resource editor to create visual resources, such as menus, windows, dialogs, and icons, and use a resource compiler for more textual resources, such as lists of strings, or balloon help text.

See Also
Compiler; Handle; Toolbox; ResEdit; Resorcerer; Rez

Resource Fork

See
Resource

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Resorcerer

Resorcerer, from Mathemaesthetics, is the undisputed king of **resource** editors.

It takes a great program to compete with a free competitor, as Resorcerer does with Apple's **ResEdit** , but to many programmers, Resorcerer is worth every penny in saved time.

At its heart, Resorcerer provides many of the same features as ResEdit. It's capable of editing a wide variety of resources graphically or using templates. That's where the similarity ends. Where ResEdit stops, Resorcerer keeps going.

Resorcerer has an excellent graphical editor for color icons, patterns, cursors, and so on that includes features, such as anti-aliasing that are normally found in stand-alone graphics programs.

Balloon help resources are frequently overlooked by many programmers because of the difficulty involved in adding them to a program using ResEdit. Resorcerer, on the other hand, edits all types of balloon help resources handily.

Resorcerer's template editor can handle extremely complex resources that cause ResEdit to choke. Two examples of resources that Resorcerer can handle that ResEdit can't are: **Apple event** terminology resources, which are used to tell **AppleScript** how to interact with an application, and PPob resources,

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which are used to define views in Metrowerks' **PowerPlant** .

Resorcerer also includes a template-based PICT editor that's capable of viewing and editing the individual instructions that make up a PICT image. Careful use of this editor can help pare down significantly the size of some PICTs without affecting their appearance.

One of Resorcerer's most useful features is its capability to search all resources in a file for any text or **hexadecimal** string. This makes it very easy to find text hidden in a resource. It also can compare two resource files and flag non-matching resources.

Finally, Resorcerer effectively bridges the gap between resource *editors* and resource *compilers* with its support for **Rez** scripts. Most resources can be converted to Rez format, *DeRezzed*, as easily as copying to the Clipboard. Similarly, Resorcerer can convert most Rez files directly into resources.

Resorcerer is published by Mathemaesthetics.

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See Also
AppleEvent; AppleScript; Balloon Help; Hexadecimal; ResEdit; Resource; Rez

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Restart

When you first turn on your Macintosh computer, you are **starting up** ; the act of turning on the computer and having it load the system software. If while working you have a **system error** or software problem, you may have to restart your computer. By choosing to restart, you turn the computer off and then turn it right back on, flushing the computer of anything you were doing and starting from scratch, as if you had just turned it on for the first time.

A restart can be done through a **command** , a **keyboard shortcut** , through a button on the front of some models of Macintosh, or by turning off the power switch on the back of the Macintosh and then turning it back on (although the last way is the least recommended). If you need to restart, you can return to the **Finder** and choose the Restart command from the **Special menu.**

This capability restarts the computer and reloads the system software as if you just turned it on for the first time. A keyboard shortcut, Control-⌘-**PowerOn key** , does the same thing: a restart. Also, in System 7.5 and higher, if you press the PowerOn key on the keyboard, a dialog box appears asking you, "Are you sure you want to Shut Down your computer now?" You have the choice of shutting down or restarting by clicking the appropriate button. You can also cancel this command if you press the PowerOn key by mistake.

Certain models of Macintosh have a reset or a restart button on the front or

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side of the Macintosh. It's usually a small round button near the bottom of the computer. Pressing that button restarts the computer. If all else fails, you can turn the power off on the back of your computer and turn it back on, but it is recommended that you use one of the previous methods first and only turn the computer off manually if none of the other methods work. Also, if you have a system error, the **dialog box** that lets you know you are experiencing a system error might include a Restart button right on the dialog box, and if your **mouse** is not **frozen** from the system error, you may be able to click the Restart button to invoke a restart.

Restarts are sometimes required after a new application or **extension** is installed, or even if you've made changes in control panels. The changes don't take effect until you restart. Restarting enables these new items to properly load into your system. Also, if you need to rebuild your desktop file (in case it has become corrupted), you can hold down the Option-⌘ keys during the restart and you'll be prompted with a dialog asking if you want the desktop rebuilt.

The act of restarting is also often referred to as **rebooting** .

To restart your Macintosh, follow these steps:

1. In the Finder, choose Restart from the Special menu. Or you can press the keyboard shortcut: Control-⌘-PowerOn key.

2. If your model of Macintosh has a restart button on the bottom front of your computer case, you can press the restart button to restart.

3. You can also press the PowerOn key and then press the restart button that appears in the Shut Down dialog box.

4. If none of these methods works, turn the power button on the back of the computer to the Off position, wait a second or two, then turn it back on. This is the least recommended way and should be used only if the other methods fail to restart your Mac.

See Also
Command; Dialog Box; Extensions; Finder; Freeze; Keyboard Shortcut; Mouse; PowerOn Key; Special Menu; Startup; System Error

Restoring Unsaved Items After a Crash

In **System 7** and higher, there are certain instances where you can restore an unsaved file after a **crash**. If you're working in an application and the machine freezes up without giving you the opportunity to save an open document, you may not be out of luck. Upon restart, look in the trash can on the desktop (by double-clicking the trash can icon). If it contains a folder titled, "Rescued Items," you may be in luck. Look in the folder to see if any files appear with the name of the application you were using followed by the word "Temp." This is the invisible temporary file that was held in **RAM** while you were working. When you restart, the Mac looks for these files to put in this folder. If you find a rescued file you think might be the temp file for the document you were working on, drag it out of the **Trash**. Then try to open

the rescued file from within the application it was created in. In many cases it opens, and you may be able to retrieve some or possibly even all of the information from the document you were working with before the crash.

However, don't count on there always being a Rescued Items folder. This function doesn't work with all applications or all situations and cannot be relied upon; always do saves as your working on your documents in case you should have a crash. That's your only real protection; the Rescued Items folder is a worst case scenario, last ditch effort to retrieve your work.

See Also
RAM; System 7; System Crash; Trash

RET
See
Printers, Inkjet

Retrospect Remote
See
Backing Up with Tape Drives

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Return Key

The Return key is used for a host of actions on the Macintosh. It moves the **I-Beam** text cursor to the beginning of the next line for paragraph breaks. It also serves as a keyboard shortcut for changing the name of a file. **Clicking** the file and pressing the Return key **highlights** the name, enabling you to change it. The Return key is also used to choose the **default** button in **dialog boxes.** (The default button has two dark outlines around it.)

The Return key and Enter key (appearing on extended keyboards) share many of the same functions.

See Also
Click; Cursors; Default Button; Dialog Box; Enter Key; Highlighting

Return to Zork

Return to Zork is an amazing accomplishment on many levels. Unlike many CD-ROM games, the incorporation of live actors is actually well done and the characters effectively draw you into the mythical land. From the old drunk at the windmill station to the giggly witch in the swamp, you interact with believable characters as you explore a wonderful and sometimes terrifying world. For older gamers, Zork is a text adventure come to life. In the days before multimedia enhancement, one of the most popular forms of gaming was interactive fiction. Reading lines of text, you entered a few

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simple commands at the end of each scenario and were taken to the next level of the story. Depending on the choice you made, the story would take multiple twists and turns. Infocom's original Zork was based on Adventure, a very early computer game created on a mainframe at Stanford.

In Return to Zork, live characters are seamlessly integrated into the **3-D rendered** landscape. Like **Myst**, much of the Zork world has been turned into a barren wasteland, but there are still enough people to talk to, so that you can find out where everyone went. To get to the bottom of things, you need to gather as many off-the-wall artifacts as you can, solving puzzles long the way. Some aspects of Return to Zork are so complicated that even veteran gamers will end up frustrated (you really need a Strategy Guide to get you through this one) but overall, the game is an perfect example of how multimedia can and should spice up the **adventure game** format. Activision's latest installment, Zork: the Nemesis, will be available soon.

See Also
Adventure Games

Revert Command

The Revert command, found on the **File menu** in many applications, reverts your document to its last saved version. For example, if you open a document that you've been working on for days, and you make a few changes and then decide the changes weren't necessary, rather than retracing all your steps,

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you can choose Revert and the document reopens in the form it was last saved in.

When you initially open a document, revert does not appear. The Revert command appears only when changes have been made to a document, giving you the option of returning to the previously saved version. Not all applications support the Revert command. To see whether yours does, look on the File menu after you've made changes to a document that had been previously saved. If Revert does not appear on the File menu, then the revert function is not supported.

To use the Revert command, follow these steps:

1. Pull down the File menu in your application and look for the Revert Command (If it's not there, your program does not support Revert).

2. Select Revert and you'll get a dialog box asking you whether it's OK to revert to the previously saved version.

3. If you want to Revert that document, click OK.

4. Your document reappears in its previous form.

See Also
File Menu; Save Command

R

Rez

Rez is a compiler used to generate **resource**s from a text description or the format of the text description (the Rez *language*).

Unlike more visual resource editors, such as **ResEdit** and **Resorcerer**, Rez uses a text-based approach to creating resources. Originally an **MPW** tool, Rez has spawned a family of resource compilers capable of understanding the same resource description language. Both **Symantec C++** and **CodeWarrior** include their own resource compilers that function similarly to Rez.

The Rez language is fairly straightforward and should look familiar to anyone who has programmed in **C** or **C++**.

The following code shows a sample of Rez language:

```
resource 'MENU' (mFile, "File menu", preload) {

    mFile, textMenuProc,

    MenuItem11,

    enabled, "File",

    {

        "New",

                noicon, "N", nomark, plain;
```

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"Open...",
        noicon, "O", nomark, plain;
"-",
        noicon, nokey, nomark, plain;
"Close",
        noicon, "W", nomark, plain;
"Save",
        noicon, "S", nomark, plain;
"Save As...",
        noicon, nokey, nomark, plain;
"-",
        noicon, nokey, nomark, plain;
"Page Setup...",
        noicon, nokey, nomark, plain;
"Print...",
        noicon, nokey, nomark, plain;
"-",

```
                    noicon, nokey, nomark, plain;

          "Quit",

                    noicon, "Q", nomark, plain;

     }

};
```

The whole idea of describing resources in a textual format might seem a little backward. After all, why would you want to describe a resource in Rez when you can just *draw* it in ResEdit? Well, there are some very good reasons.

Although some resources, such as icons, would be difficult to create in Rez, others, such as lists of text strings or balloon help resources, are well suited to a text representation. And some very complex resources, such as **PowerPlant** "ppob" resources, can't be created in ResEdit at all (Resorcerer and **Constructor** can handle them).

Because the Rez language supports C-style include files, it's easy to keep resource ID numbers consistent between a set of C or C++ source files and the resources themselves. Also, text descriptions of resources are frequently easier to include in books or to transfer to other computers whose files aren't blessed with resource forks.

No discussion of Rez would be complete without a mention of its sister, DeRez. DeRez, reversing the process of Rez, creates a text description of compiled resources. Combined with a resource editor, Rez and DeRez make a powerful

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combination.

See Also
C; C++; CodeWarrior; Constructor; MPW; PowerPlant; ResEdit; Resorcerer; Resource

RGB

The colors of light used to display images on video monitors (including televisions and computer monitors) are red, green, and blue. These are considered the additive primary colors, and they're used by many scanners as well.

Color images stored in digital form can be defined in terms of these colors, or in other terms (such as **CMYK**, which is used in the printing industry). Graphics software (such as Photoshop) can convert images from one color definition to another, but there are colors in each definition that aren't achievable using other definitions.

See Also
Color Gamut; Color Management; CMYK; Desktop Publishing Color Models

RIB (RenderMan Interface Bytestream)

The file format used by **RenderMan**, the high-quality rendering software

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from **Pixar** .

See Also
MacRenderMan

Rich Text Format (RTF)

Rich Text Format (RTF) is a file format developed by Microsoft to make it easier to transfer files between different programs or across platforms to DOS, Windows, or UNIX computers. RTF retains all of the formatting by converting it to instructions that other applications can interpret. All Microsoft applications can read and interpret these files, as can most other word processors and desktop publishing programs. When you copy formatted text into the Mac scrapbook, it's saved as RTF, so that it will appear in the same font and style when you later paste it somewhere else.

Riddle of Master Lu, the

This title from Sanctuary Woods puts you in the shoes of Ripley of "Ripley's Believe It or Not" fame. You and your assistant Mei Chi return from the "speaking" statue of Memnon to find that your office has been trashed and your business partner Feng Li has been left tied to a chair with a vicious cobra on the loose. From there, you enter the world of 1936 Peiping, China in an attempt to solve the mystery of who ransacked your place.

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In addition, you are constantly on the lookout for strange articles to send back to New York to the Ripley museum in an attempt to raise public interest and generate revenue. The development team at Sanctuary Woods has done a great job integrating video with two and three dimensional artwork. Some hard-core gamers may find waiting for the characters to move a little slow, but the puzzles are tough and the game interesting enough to hold your attention. The recreation of 1930's China and New York is quite authentic looking and draws you into the time and the story. Sanctuary Woods has recently released a new version of Master Lu that is optimized for the Power Mac and should do away with some of the wait time.

See Also
Eastern Mind; Full Throttle; Hell; Myst; Return to Zork; 7th Guest, the; Daedelus Encounter, the; TimeLapse

Right Alignment

Text that is right aligned has a straight margin on the right, and a ragged margin on the left. It's also called "flush right" or "right justified." The easiest way to do it, in virtually any word processor more sophisticated than **SimpleText** , is to click the right alignment text icon on the toolbar (**MicroSoft Word** , **WordPerfect**) or on the ruler (**MacWritePro** , **WriteNow**).

See Also

R

Alignment

Right Arrow Key

The Right Arrow key enables you to navigate through an open document by moving the cursor to the right one character at a time. You can **select** the character to the right of the **cursor's** insertion point in a document by pressing Shift-Right Arrow key, or you can select the entire word to the right of the cursor's insertion point by pressing Shift-⌘-Right Arrow key.

In a window set to **View by Icon** , you can select the icon to the right of the selected icon by pressing the Right Arrow key.

If you're in a window displayed in an **Icon view** , for example, you can **click** a **file** and then use the Right Arrow key to select any icons to the right of the current selection.

There are a number of modifier keys you can use with the arrow keys. Here's a table of the most common keystrokes using the arrow keys.

Arrow Keystrokes

Sequence	*Result*
⌘-Left Arrow	Collapses Expanded Folder
⌘-Down Arrow	Open Folder/Open Next File

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⌘-Right Arrow	Expand Folder
⌘-Up Arrow	Go to Previous Folder
⌘-Option-Up Arrow	Close to Previous Window
⌘-Shift-Up Arrow	In Open/Save Dialog it Selects Desktop
⌘-Option-Left Arrow	Collapses All Expanded Folders
⌘-Option-Right Arrow	Expands All Nested Folders
Shift-Right Arrow	Selects Character to the Right of Text Cursor
Shift-Left Arrow	Selects Character to the Left of Text Cursor
Shift-⌘-Right Arrow	Selects Word to the Right of Text Cursor
Shift-⌘-Left Arrow	Selects Word to the Left of Text Cursor

See Also
Click; Cursor; File; I-Beam Cursor; Insertion Point; Mouse; Select; Views

RIP
See
Raster Image Processor, Printing Technology, Laser

R

Risk
See
Classic Collection

Ritchie, Brian
See
C

Rj-11
See
Modem/Connecting

Roaster
See
Java

Rock, Rap, 'n' Roll
This interactive CD-ROM, officially called Mega Rock, Rap, 'n' Roll, enables

you to play with melody and rhythm to create songs in a variety of styles. Rock Rap 'n' Roll is a digital music machine designed to let kids and adults have fun with music. It uses pre-composed music attached to a colorful interface to let a user "doodle" with music. The end result can be loose and unstructured or can be a rich, mixed down song. The name is a little misleading, because there are actually ten different musical styles represented, all the way from Big Band and Reggae to TechnoPop and Africa. Once you select a style, you're presented with a palette of melody segments, as shown in the figure. You click the melodies to hear them.

Select the ones you think might sound good in sequence, and line them up. Then add extra instruments and singers. You can play along, using the keyboard to change pitch. When you've rehearsed your composition, you can record it and save it. This program doesn't pretend to teach music. But it demonstrates styles, and is a lot of fun to play with. Because the segments have been pre-composed to relate to each other, you're practically guaranteed to end up with a song that's worth keeping.

See Also
Juilliard Music; KidMusic; Peter & the Wolf

Role-Playing Games

Role Playing Games (RPG's) , closely related to **Adventure games** , are similar to the Dungeons & Dragons craze of the early eighties. In Dungeons &

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Dragons, people played according to a series of class levels, hit points, talent and skill levels that were determined by rolling multi-sided dice. Each player would create several characters as his or her party and then engage in battle with other players characters by rolling the dice. Depending on the roll, your characters gained experience or hit points or would be injured or even killed by your opponent.

Many players banded together in groups and played as teams. As far as interactive RPG's go, they draw on the main aspects of D&D and use them to immerse you in a computerized fantasy world. The plots of RPG's are generally much more in-depth even than adventure games and provide detailed world histories, species profiles and sketches of specific characters and class levels. Titles like **Might & Magic III: Worlds of Xeen** from New World Computing get into the technical aspects of the role playing genre, incorporating dice rolls into character selection and hit and skill points into game play.

See Also
MUDs and MOOs

ROM
See
Power Mac Logic Boards

R

Root Directory

A disk's root directory is the first level you access when you open a hard disk, and the contents of this directory are presented in a window; it is the base level, the root, of all your other areas. If, for example, you're at the Finder and want to look at the contents of your hard disk, you double-click the hard disk's icon. A window appears showing you the contents of the Root Directory of this hard disk.

If you're working in an application and someone tells you that a particular file is stored at the root directory, they're telling you that the file is located in your hard drive's main level. Although this term is very popular on the PC platform, it is rarely used in the Macintosh environment.

See Also
Hard Disk

Root Level

see
Root Directory

R

Rothmueller, Ken

See
Lisa

Rotoscoping

This term describes the process of drawing or painting on top of film or video. Rotoscoping is sometimes used in traditional animation.

Rotoscoping also is used in some 3D programs to describe a process that maps a sequence of images onto an object's surface. This process is sometimes referred to as animated **texture mapping** and can be used to create effects, such as a animated picture of the screen of a 3D model of a television screen. Most 3D programs that offer this feature use a **QuickTime** movie as the source for the sequence of images. Programs that offer this feature include Specular International Inc.'s **Infini-D** and Fractal Design Corp.'s **Ray Dream Designer** .

See Also
Filmstrip; Texture Mapping

Routers

Routers are the network devices which act as controllers, directing and

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forwarding network **packets** as they deem appropriate. Although many network devices such as **hubs** and even **bridges** simply repeat and pass on all information they see, routers are responsible for dissecting and reading each packet they receive to determine the appropriate destination.

If you have a network that has grown so large that you want to split it into smaller, more manageable networks that are connected to each other, or if you want to connect a small network to other networks, perhaps in the same building but on different floors, you can use a router to link these networks.

In a sense, bridges, switches, and repeaters are similar to the traffic police who wave cars through intersections when their turn has a arrived. Routers, on the other hand, act like security guards at the front gate of a building who stop each car and check for identification, to insure that the driver is in the appropriate place, and then provide more detailed directions on the best route to your final destination.

Beyond routing traffic, routers also possess the capability to translate between network protocols. For example, a router is used to connect Macs on **EtherNet** and Macs on **LocalTalk**. This enables you to gradually upgrade an office by purchasing new computers with EtherNet, but allow full connectivity to older Macs and printers that are using LocalTalk. Routers are also used to connect Mac networks to the Internet or to larger networksd where protocola like IPX are used.

See Also
Bridges; EtherNet; Hub; LocalTalk; Packets

R

Row in Databases

A row is a horizontal line of **cells** in a **spreadsheet** . All Macintosh spreadsheets designate rows numerically, starting at the top. The first few rows are typically used for identifying text, showing the title of the spreadsheet and a description of each **column.**

See Also
Absolute/Relative Referencing; Circular Reference; Spreadsheet Notation

RS-232

The most widely standard used for the connection of personal computers to asychrononous peripherals is known as RS-232. Most personal computers (and early Macintosh computers) implement this type of connection using industry standard DB-9 or DB-25 ports. Recent Macintosh computers use a slight variation of this standard, the RS-422 serial port with a circular DIN-8 connector. (The GeoPort is a further variation of this connector).

RTF

See
Rich Text Format

R

RTS
See
Flow Control