Final Cut Pro 4 Basics

How Nonlinear Editing and Final Cut Pro Have Changed the Editing Process

As recently as the late 1990s, video was linear. To get to the end, you first had to watch the beginning and then the middle. If you were editing, you had to finish one sequence before doing any work on the next. Edits were permanent. If you went back and changed something in the beginning, you could easily ruin everything that came after it. This inspired fear in some and bravado in others. (A friend once told me about a particularly macho editor who put a bumper sticker on his car which reads "Real editors don't hit Preview.")

Today, we live in much happier times because Final Cut Pro lets you make changes to your edits and leave the material around them intact. In addition, Final Cut Pro gives you the ability to replace a few frames of video, an entire shot, or even a whole sequence. You can shape your video to fit your vision without fear of having to redo everything if you decide to make even a small change.

Final Cut Pro also provides a level of organization that would satisfy the keenest hunger for order (picture Felix Unger editing a movie). You can group your clips into clearly labeled bins and divide your clips into subclips. Even editors who were devoted to cutting and splicing 16mm or 35mm film on a mechanical flatbed editing system have migrated to digital nonlinear editing because it's so much easier to keep track of everything. Film editors would cut and splice pieces of a film print, and hang the leftover frames, called *trims,* on a hook. There were so many trims that people would hire an assistant editor to keep track of them, and more often than not, trims would still get lost—or even worse, turn up on the bottom of someone's shoe. With Final Cut Pro, the cutting room floor is much neater.

Nonlinear video editing is frame-accurate. Video is measured in hours, minutes, seconds, and frames (approximately 30 frames per second). Final Cut Pro lets you place a specific frame of video exactly where you want it.

Final Cut lets you import digital video directly into your computer system, and then edit the video in an entirely digital process. You can easily create different versions of a project for different purposes, safely experiment with a wide variety of effects and transitions, and you can even finish your project and ensure it conforms to broadcast quality standards. The current version, Final Cut Pro 4, allows you to dynamically mix audio tracks in real time, generate sophisticated animated titles, and export finished products for distribution via the Internet, CD-ROM, DVD and, of course, videotape.

With Final Cut Pro, you can revise and polish your work until you're 100 percent satisfied (or at least until your client thinks you're the best editor on the planet). You have exact control over how things appear in your show and meticulous command of each shot's beginning and end, down to a fraction of a second. Digital video and Final Cut Pro have changed the way that people edit.

What's the Difference between Analog and Digital Video?

For years, analog video was all that existed, and analog video is much harder to edit than digital video. I often begin a semester by asking students the difference between analog and digital media. People come up with a variety of answers, usually having something to do with "digital is better," but in reality, the difference is digital media is the product of a computer: Sound and images are recorded as

binary information—a collection of 1s and 0s. Analog media, in contrast, uses a mechanical process to record and play back audio and video. Once media becomes information that can be stored and edited on a computer, the media becomes much easier to work with. Think of how easy it is to cut and paste text in a word processing program and how hard it would be to shift paragraphs around a printed page using a typewriter, a pair of scissors, and some Elmer's glue. It would still be possible, and people wrote great works of literature long before the invention of Microsoft Word, but the process was a lot messier.

Part of the ease of nonlinear editing comes from random access. Digital media allows you to get to any section of recorded material at any time, which makes editing much faster. Compare opening a thick volume of text to a bookmarked page versus slogging through 5,000 words to reach the same paragraph. Nonlinear editing is possible because digital media allows you to access specific information with the click of a mouse. Digital technology permits nonlinear editing and analog doesn't, because the two forms of media process, store, and handle information differently.

Analog videotape uses a physical process to play back sound and images. The tape runs across a playback head, and the videotape deck converts the electromagnetic signal on the tape into sounds and images. If you play a tape often enough, it wears out. If you put the tape too close to a magnetic field, such as a video or sound monitor, you can erase parts of the tape. Cheap tape is often less reliable and has a shorter life span than higher-quality tape. Even the best videotapes suffer a loss in quality as they age because the physical material starts to decay. (The analog tape that you worked so hard to record and edit just doesn't last forever.)

Digital media doesn't employ a physical process. Instead, digital video stores sound and images as a series of instructions. Computers read the instructions and reproduce the sounds and images you record exactly the same way each time. Once you capture and store these instructions on your hard drive, you can play back the same material repeatedly without a loss in quality or damage to the original. If you make a backup copy, your material survives even if your computer crashes or your hard drive fails.

Because digital media uses computer instructions instead of a physical process, you can make an infinite number of backup copies, easily transfer media from one computer to another, and capture material from the camera with no loss in quality.

FireWire Video Capture

Have you ever made a cassette copy of a record album? (You do remember record albums, right?) The cassette would never sound as good as the record, and if you made another cassette from your cassette copy, the second cassette would sound even worse. There's a loss in quality each time you get farther away from the original. Each copy is referred to as a *generation,* and the strength of the analog signal breaks down more with each generation.

Digital media doesn't break down the same way. Because it's saved as computer information, each copy is identical to the original. In fact, duplicate copies of digital videotapes are often called *clones.*

When you record to digital videotape, your camera stores the video as digital information. Once it's copied to your hard drive, this information can be shared and reproduced as easily as any other digital file. The trick is getting the material into your computer. In the early days of digital video editing, there was rarely a way to get the digital information directly from the camera to the editing system. Even people with expensive, high-tech digital editing systems often used an analog connection to capture footage shot on digital tape. As you can imagine, there was a de facto loss in quality. If the editor doing the capture was good, the quality loss was barely noticeable, if anyone could see it at all. However, if the editor didn't know what he or she was doing, there could be real problems. At best, this method created an inconvenient extra step.

Macintosh computers now come with FireWire ports as standard equipment. FireWire, called IEEE 1394 in non-Mac computers, is a digital interface that lets you connect your computer to a video source and capture the information on your videotapes with no loss in quality. Once you have the information stored on your hard drive, it's exactly the same as what's on your tapes, which you can then archive as backup copies.

Because Macs ship with FireWire ports already installed, connecting your computer to digital video equipment is as simple as plugging one end of a FireWire cable into the computer and the other into your deck or camera. FireWire connections are much faster than other interface types, such as USB, and also allow you to control a camera or deck through your computer. You can also use a FireWire connection to transfer media between your computer and an external hard drive, which can easily expand your storage space by a few hundred gigabytes.

Analog Video Capture

FireWire capture ensures that the material on your hard drive is identical to the information on the original tape. Analog video capture is another ballgame—basically it's a rerecording. There are three basic types: component, composite, and S-video.

Professional analog cameras (yes, people still use them and they're very good) record in *component video*. The component signal breaks video color and brightness information into three parts, or components, which hold up well in editing. If you've ever seen news crews walking around with big video cameras, they're most likely shooting component video, such as BetaSP.

The consumer video signal (what you see on your TV or VCR at home) is called *composite video.* This is essentially a compressed version, or composite, of the professional signal. The quality is not as good and breaks down more easily.

Somewhere between composite and component is *S-video*, which is found in higher-end analog consumer products. Before digital video and FireWire became common, people used S-video for sophisticated home editing systems.

Analog video capture involves a rerecording of your source material into a digital format and requires the use of waveform and vector scopes to ensure good quality. The tutorial files in this book are delivered as digital media, so analog capture isn't explored in detail in this book. Digital video acquisition is discussed further in Part II. If you are interested in more detailed information on analog capture, I suggest reading *Final Cut Express and Final Cut Pro 4 Bible* (published by Wiley Publishing, Inc.).

SMPTE Timecode

The random access that makes nonlinear editing possible is based on timecode. *Timecode* identifies the exact position of each piece of video and is written in hours, minutes, seconds, and frames—for example, 01:15:20;05 means one hour, 15 minutes, 20 seconds, and 5 frames. When you transfer media from your camera to the hard drive of your computer via FireWire, you capture the audio and video information along with the timecode.

Not all analog media contains timecode. Professional analog video—such as the Beta cameras and decks that are used by news crews—uses timecode, but the standard home VCR does not.

Timecode is what makes nonlinear editing frame-accurate, and without timecode, nonlinear editing just doesn't work. The hours:minutes:seconds;frames timestamp that is on a video tape is always the same, regardless of what deck you play the tape on. When you capture digital video in Final Cut Pro, the software asks you to enter an identifying name or number for each tape. Final Cut Pro stores the tape name and the timecode information for all the material that you capture so that you can identify each piece of audio and video, down to 1/30 of a second, and access it instantly. Final Cut Pro also generates timecode when you edit clips together into a sequence. You can use this timecode to create an Edit Decision List (EDL), which you can bring to a postproduction house for completion as a film print, a sophisticated broadcast-quality digital Beta, or a high-definition master tape.

There are two types of timecode: drop frame and non-drop frame. Broadcast television signals operate at a slightly different speed than a clock, so a program's length in timecode may differ slightly from its actual length in hours and minutes. To compensate, drop frame timecode drops, or skips, frames at regular intervals to conform the length of a program to a standard broadcast clock. Drop frame timecode is written with a semicolon between the seconds and frames (01:15:20;05) while non-drop frame is written with a colon between the seconds and frames (01:15:20:05). Before computerized editing systems, editors worked with non-drop frame timecode because it was easier to calculate. Final Cut makes drop frame timecode much easier to work with. NTSC, the broadcast video standard for North America, uses drop-frame timecode, as do the video files on this book's CD-ROM.

Nondestructive Editing

When you create a sequence in Final Cut Pro, you're not actually cutting the media files, or even editing them. You're instructing the computer to find particular pieces of video on your computer's hard drive and to play them back in a specific order. This is called nondestructive editing.

Nondestructive editing with Final Cut Pro takes the pressure off of you as an editor, and opens up a whole world of opportunities. Not sure if something will work? Go ahead and try it out. If you're not happy with the results, press ⌘+Z or choose Edit→Undo. Because you're not actually changing the media files, you can experiment without irreversible consequences. If only the rest of life were that simple.

Storing Media

When you set up your Final Cut Pro system, you tell the computer where to store the media you capture. You can change the setup for each project you create, and

you can make changes while you're working on a project. Your media files and the editing instructions, called *project files,* can be stored on the same hard drive or in different locations. Media files take up large amounts of memory, but project files are small enough that you can easily save backup versions to a Zip disk. This also allows you to save different versions of a project. For example, you can save one version as a director's cut and make another, shorter version for television broadcast. I create a different version of my project files each time I make a major change, so if I don't like the way something works out, I can just go back to the older version. I also make backup copies of my files so my world won't come to an end if my computer crashes. Making backups may seem like an unnecessary precaution, but believe me, it's not fun to lose something you've spent a long time working on. You know how it never rains when you bring your umbrella, but it pours as soon as you leave it at home? Save yourself a headache, and back up your project files. The worst thing that can happen is you'll have some added peace of mind.

System Requirements

Final Cut Pro 4 requires a Macintosh computer with a PowerPC G4 processor and an AGP (Accelerated Graphics Port) graphics card. The software also requires the following items:

- 350MHz or faster processor
- 384MB RAM; 512MB is recommended for real-time effects
- DVD-ROM drive
- 6GB audio/video–rated hard drive; 20GB or larger is recommended
- Mac OS X v10.2.5 or later
- QuickTime 6.1 or later

System Configurations

Editing systems are configured based on the needs and resources of each editor. A Final Cut Pro system requires a way to capture media, a computer to edit and process the media, at least one monitor to view the program, and a means to output the media in a format that is accessible to the audience. Depending on the type of project, the medium of distribution, and the project budget, editing systems can be configured differently.

The bare-bones system

Each Final Cut editing system must have at least a source deck to play back the recorded tape. You can use your camera, but if you use a dedicated deck instead, your camera lasts longer. The system then requires a connection from the source deck to the Mac. For digital video, a FireWire connection is the best and easiest way to go. Analog video requires a digital-to-analog converter. It is a given that every system also needs a monitor. And, because computers generally have monitors attached to them, many people stop there. However, the only way to judge what a program looks like on TV is to view it on a TV monitor.

Computer monitors and video monitors process images differently. A computer monitor uses *pixels,* or tiny squares, to create images. Video monitors and television sets use lines of resolution, which are horizontal lines. Because the two processes differ, video may not look the same on a computer monitor and on a TV screen. To avoid surprises, editors often connect a dedicated video monitor to their Final Cut Pro systems, make their edits using the computer screen, and then evaluate the results on the video monitor.

The videotape system

Exporting the completed project as a videotape requires a record deck, which can record the video signal output of the Final Cut Pro system. Editors on a tight budget often use the same digital video camera for their source deck and their record deck. Editors with greater means may use a VHS or Super VHS (S-VHS) deck to record a composite analog version of their work as well, and professional editors often output a component analog version of their project to a BetaSP deck, or a component digital version to a DigitalBetacam deck. Analog output requires a digital-to-analog converter.

Editors working at the really high end may not output directly to tape from their system in any format. Instead, an editor with even the most basic Final Cut Pro system can output an EDL to take to a postproduction house as a computer file. Working with the postproduction facility staff, the editor can use the EDL to assemble video from the original source tapes into a super-high-quality program, which is then output as a DigitalBetacam master tape or even as high-definition video for broadcast or eventual transfer to a film print. Few editors have DigitalBetacam or HD decks connected to Final Cut Pro systems, because the decks cost more than the down payment on a nice house.

DVD output

Just as digital media has changed the way people edit, it's changing the way people watch video. The consumer DVD player is making its way into homes at twice the rate of the VCR, according to the *New York Times Magazine,* and who do you know that doesn't have a VCR? Even after digital editing had become the method of choice, editors were still converting their work back into an analog format (videotape) to reach their viewers. With the advent of DVD technology, editors can now output and distribute their work as digital media, adding interactive features and maintaining stunning image and sound quality. The Mac you use to run Final Cut Pro may already contain a DVD burner, called a SuperDrive. If it does, try it out; you may be happy with the results.

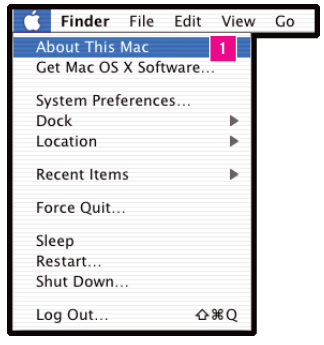
Using the Program for the First Time

Final Cut Pro requires the current versions of Mac OS X and QuickTime. Even if you just bought a brand new machine, you may still need to update the operating system before you can install Final Cut Pro. The Final Cut Pro 4 installer checks your system software before installing the application, and if the installer doesn't find the version of OS X that it's looking for (v10.2.5 or later), it doesn't install anything. Take a minute to check your system software before you try to run the Final Cut Pro installer.

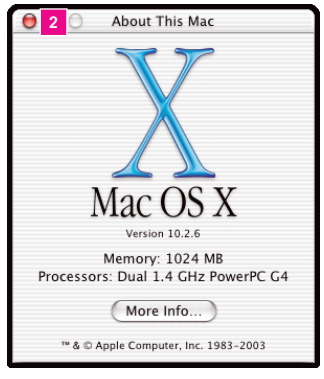
Tutorial

» Check the System Software

Before you attempt to install Final Cut Pro 4, you can easily check to see if your computer meets the criteria as listed in the System Requirements section earlier in this chapter. In particular, you want to be sure you have the proper operating system installed—Mac OS X v10.2.5 or later.



1. **Click the Apple icon in the upper-left corner of your screen, and select About This Mac from the pull-down menu that appears.**
A new window opens that displays your operating system version (for example, 10.2.6), the amount of RAM that's installed in your computer, and the processor speed.



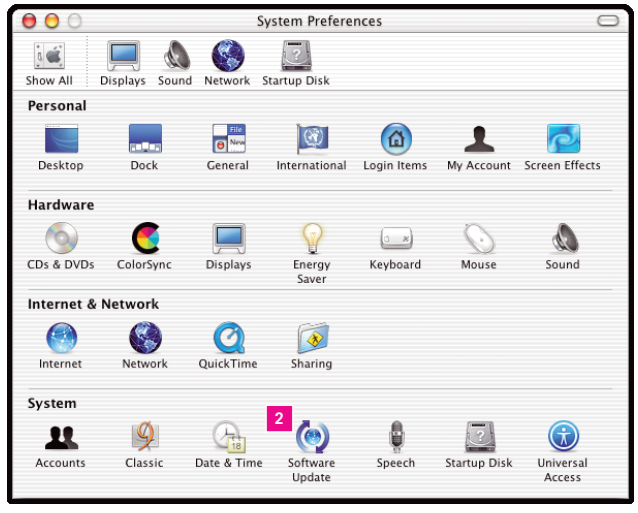
2. **Click the red button in the upper-left corner to close the window.**
If you have an older operating system, or need a later version of QuickTime, you can update your software in the next tutorial.

Tutorial

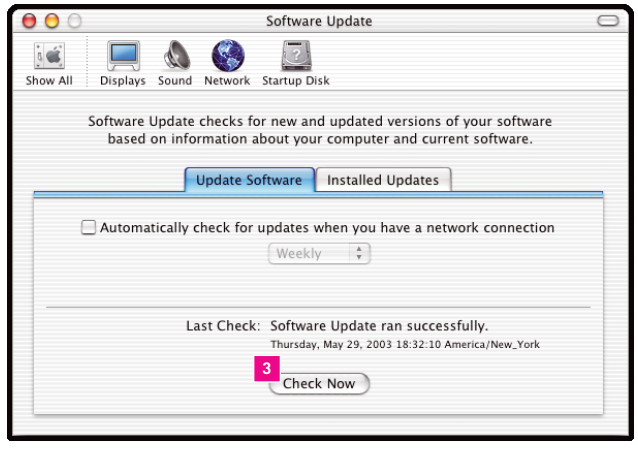
» Update the System Software

If you check your system software and find that something's missing, don't panic. Macs ship with a built-in software update, in this tutorial you learn how to use it. If you check your system and find that you don't need to update anything, you can skip this tutorial.

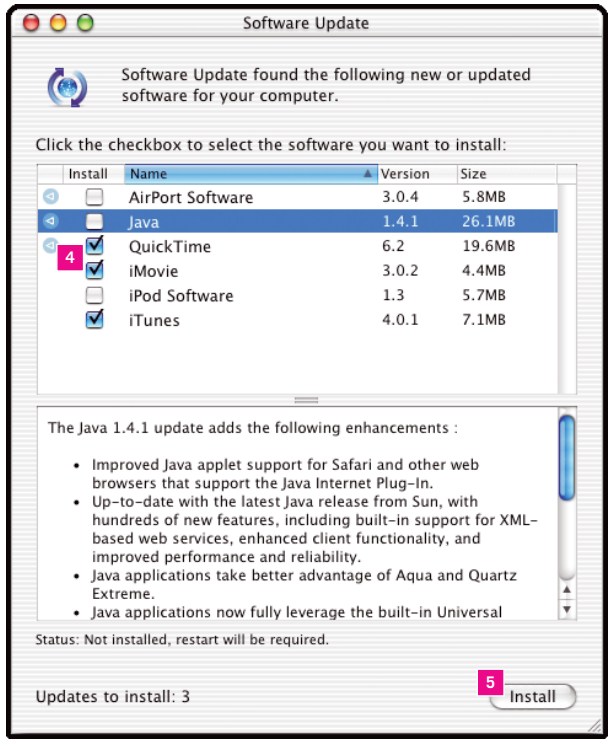
1. **Click the Apple icon in the upper-left corner of your screen, and select System Preferences from the pull-down menu.**
   The System Preferences window opens.
2. **In the System row, click Software Update.**
   The Software Update dialog box opens.



3. **With the Update Software tab active, click the Check Now button.**
   If you are currently connected to the Internet, Software Update checks to see whether updates are available for the software on your computer. A new Software Update dialog box opens listing the new versions of your software. By default, items in the list appear with a check mark in the Install column, meaning that they install themselves when you click the Install button.



<NOTE>
If you don't have an Internet connection, Software Update doesn't work. Instead, contact AppleCare or your local Apple retailer to see if any software you might need is available on disk.



4. **In the Install column, deselect anything that you don't want to update.**
   Deselected items are not installed.

5. **Click the Install button.**
   Your Mac automatically downloads and installs the new versions of the software.

Final Cut Pro comes with a Read Before You Install document on the installation DVD. This document is worth the time it takes you to read it, and can save you some headaches if you actually do read it before you install anything.

Before you install QuickTime and Final Cut Pro, connect and turn on your video source deck or camera so that the software can detect the equipment that you use to capture video.

Final Cut Pro offers you a world of options. A few years ago, only a handful of professionals had access to this level of quality, and it was extremely expensive. Nonlinear editing systems in 1999 routinely cost more than $60,000. Now you have one on your desktop, and it's much more powerful that those from just a few years ago.

In the words of a famous New York sportscaster, "Let's go to the videotape."