Producing and Adding Video

Digital video has made tremendous strides in the last five years. This is a complex science that doesn't lend itself to a thorough explanation in one short chapter. While this chapter introduces you to the fundamentals of digital video, the list of what it doesn't cover is almost as long as the list of what it does cover. This chapter defines the terms you will come across in making buying decisions about video hardware and software. More important, this chapter is full of references to other more comprehensive sources, most notably, magazines that include up-to-the-minute reviews of hardware and software.

The short version is if you are serious about putting high-quality video on your Web site, you must either devote a tremendous amount of time and a lot of money to the under-taking or you should hire a company dedicated to video compression to take your edited analog video and convert it into a Web-ready format. If you simply want to produce the kind of video — small frame size and choppy — you see on most Web pages, this chapter gets you started nicely. In any case, you need to know the vocabulary and the anatomy of digital video.

Introduction to Digital Video

Video is by nature an analog product. Converting analog video into ones and zeros has always been fraught with challenges. With still images, you have a similar problem: how to store colors and shapes as ones and zeros in as little space as possible, while retaining as clear a copy of the original image as possible. With video you have the added dimension of movement.

With film, motion is created by showing a series of still images in rapid succession. The more images in a given time interval, the more fluid the motion. If you start with clear still images and add fluid motion, you have top-quality video or film.

When digitizing video, you have to consider the size of the frame and the number of colors (2 if just black and white, 256, or even 1.7 million), as in capturing still images. Just as with film, you also have to decide how many still images will be seen in a given interval of time. With digital video, you also must think about compression of the images and the motion. That compression can take two forms: compression within each frame or compression between frames.

Expectations

If you spend a lot of time on the Web, your expectations are probably pretty humble. You'll settle for postage-stamp-size video that plays relatively smoothly. This is what most sites deliver today. Fortunately, the current state of video compression and delivery can help you deliver better video than this. A number of excellent products are available for desktop computing to help you produce results at better than the postage-stamp level for a consumer's budget. The resources listed at the end of this chapter point you to the state-of-the-art technology.

Garbage in, garbage out

As with many other components, with video, the quality of the digital video you produce is highly correlated with the quality of the analog with which you have to begin. While you can take high-quality analog video and still produce junk in digital form, you can't take bad analog video and produce clear, sharp digital video.

The Anatomy of Digital Video

Digital video takes advantage of the best of imaging technologies and a thing or two from audio technologies. Digital video, at its most basic level, is a collection of still images that are sequenced. Intelligent compression schemes exist that you can apply to allow the video to be compressed both within each frame and between frames.

The problem with digital video has always been the compression versus file size trade-off. If the file is too big, the computer trying to play the file will be unable to play the frames at the rate they were intended to play. If the file is compressed too much, the computer won't have the power to decompress in real time, producing the same playback problem.

Regardless of how you compress video files, capturing and editing video can require huge wedges of disk space for even the shortest snippet of video. Video capture, editing, and compression require special hardware and software not often found on regular desktop computers.

Three factors dictate video quality: frame rate, frame size, and compression technology. Compression technologies are discussed in their own section later in this chapter.

Frame rate

The *frame rate* is measured in frames per second. Full-motion video is considered 30 frames per second (fps). Films are 29.75 fps. Most video shown over the Web plays at 15 fps. The more frames you show per second, the larger the file you need to send, but the smoother the motion.

Frame size

The *frame size* is measured in pixels and indicates the amount of screen space your movie will fill. Common frame sizes are 80×60, 160×120, 176×144, 240×180, 320×240, and 352×288. Video delivered over the Web is rarely 640×480 or full-screen because the file sizes become prohibitive. This kind of video is usually reserved for CD-ROMs or DVD.

Introducing Video File Formats

Few video formats work on the Web. These include the following:

✦ **.MOV.** This is the original movie format of the Web. It isn't owned by anyone and it doesn't require any special plug-ins to play it back. On the downside, it also doesn't use good compression, so file sizes can be large.

✦ **.QT.** The QuickTime architecture is owned by Apple computers. Playback requires a special plug-in, which you probably already have on your Mac, but you have to download on your PC.

✦ **.MPG.** MPEG, the standard set by the Motion Picture Experts' Group, is probably the best, nonproprietary standard available for video on the Web. Compressing your video as MPG will take a while, but the results can be pretty impressive.

Introducing Streaming Video

Streaming video works just like streaming audio. When you compress video normally, the video file contains all the movie information, frame by frame, for the entire movie in order. In parallel with this information is information about the file: the file type, the file size, and compression information. The problem with normal video compression is that, for the browser to begin to play the movie, it has to receive all the information about the file first.

Streaming video moves all the information about the file to the front of the file. This means the first information the browser receives is the information it needs to get the computer ready to play a movie. Once the actual movie starts to download, the browser is ready to start playing the movie as it arrives. Obviously, if the file is too big or if the frame rate can't be met by the download speed, then the movie won't play back properly. Used properly, however, streaming video can be a valuable addition to your Web site.

Video Compression Schemes

Essentially two kinds of video compression exist: intraframe and interframe. *Intraframe compression* takes advantage of the kind of compression used with images. It compresses each frame as well as it can. *Interframe compression* actually compresses between frames. The amount of *guessing* you let the computer do between frames affects how smoothly the video plays back. This also affects the size of the file. Obviously, if you can drop half the frames and still have a decent video, your file size will be much smaller.

Capturing Analog Video

Capturing analog video requires some playback device, such as a VCR if your source video is on VHS tape, or a camcorder if your source video was recorded that way. Capturing analog video also requires video in jacks on the video board of your computer. You may need to purchase a special video-capture board for your computer, although more and more video cards are coming with video-capture capability. The video-capture board will likely take S-video, an 8-pin mini DIN connector, or an RCA phono jack.

Capturing digital video is something of an art. Depending on the software you use, you have to adjust from 2 to about 30 settings in the software. You also want to make sure your disk is defragmented or, better yet, that you have a separate hard drive you can reformat between each session of video capture. Capturing video

can take up a lot of hard drive space. Sometimes you'll want 30 frames from one part of a tape and then another 30 from another part. Finding the exact starting and ending frames can require capturing far more video and then editing it.

Editing Digital Video

Editing digital video is definitely the fun part. One relatively easy-to-use software package is Adobe Premiere, available for both Macintosh and Windows. When editing, you can add interesting (or annoying) transitions from one frame to the next. Figure 41-1 shows a list of transitions.
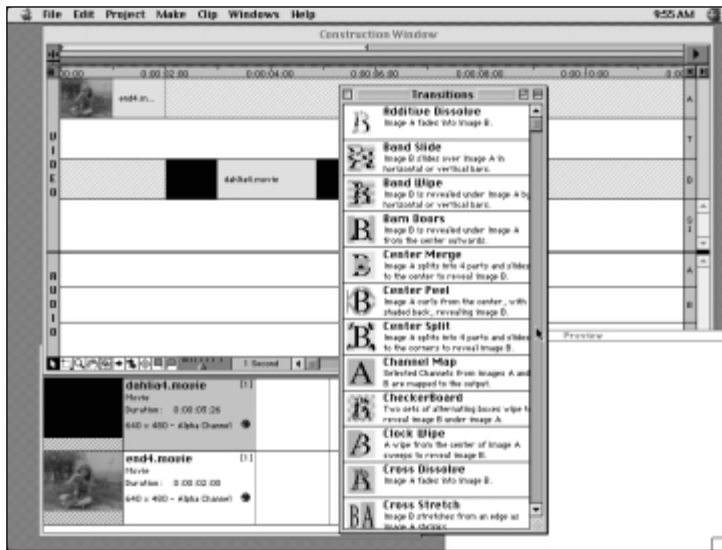

Figure 41-1: Adobe Premiere enables you to choose the transitions.

Another feature you want your video-editing software to have is titling capabilities. You might want to add scrolling credits at the end or a title at the beginning. Figure 41-2 shows the movie being titled in Premiere.

Finally, when you are done with your editing, you kick off the compression process (see Figure 41-3) and go home for the night. Frequently the compression will take overnight. The length of time it takes depends on the power of your computer, the type of compression, the length of the video, and the frame rate.
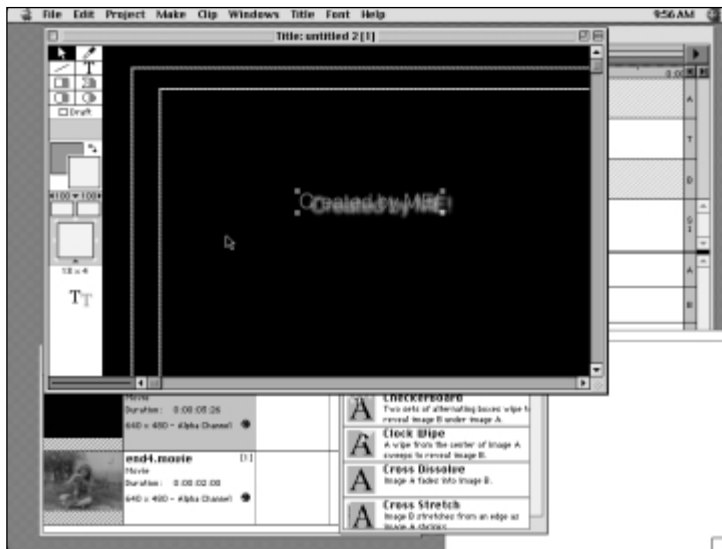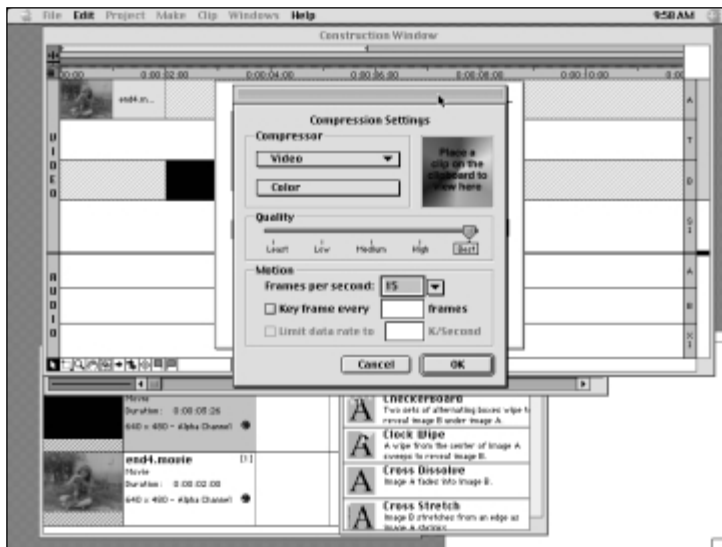
Figure 41-2: Titling with Premiere

Figure 41-3: Making compression selections in Premiere

Adding Video Files to Your Page

Video is usually added as out-of-line video, meaning to see the video, the site visitor must take an action. However, you can create inline video, which is added with the OBJECT element. The OBJECT element is discussed in depth in the next chapter. Out-of-line video is added with the familiar A element. Examples for both follow:

Inline movies

```
<OBJECT data="media/movies/cool.mpeg"
type="application/mpeg">Sorry you can't see this movie. It is
pretty cool.
</OBJECT>
```

Out-of-line movies

```
<A href="media/movies/cool.mpeg" alt="Very cool movie">Click
here to see a cool movie</A>
```

Invaluable Resources

AV Video Multimedia Producer (www.kipinet.com/av_mmp/index.html) is available by subscription or on newsstands.

Digital Video (www.dv.com) is available by subscription or on newsstands.

Videography (www.videography.com) is available by subscription or on newsstands.

Advanced Imaging (www.advancedimagingmag.com) is available by subscription.

From Here

Cross-Reference

Go to Chapter 43 to learn how to add Java applets.

Proceed to Chapter 42 to begin incorporating plug-ins and ActiveX controls.

Summary

In this chapter you learned how digital movies work, what parameters contribute to the quality and size of movie files, and how video compression works. You learned about capturing and editing video and about including video in your Web sites. Many alternative ways to create video on your page require plug-ins. These are discussed in Chapter 42.

✦   ✦   ✦