

Digital Video: A Technical Introduction

- The “ultimate” multimedia asset, some might say, is digital video
- This is an introduction to what is under the technical hood that drives digital video, particularly issues that may affect multimedia authoring

Two Kinds of “Video”

- Surprise, surprise — very similar dichotomy to images and audio
- *Full-frame*: Sequence of raster images
- *Tweened*: Sequence of vector images
- Accompanying sound is essentially synchronized digital audio (either kind)

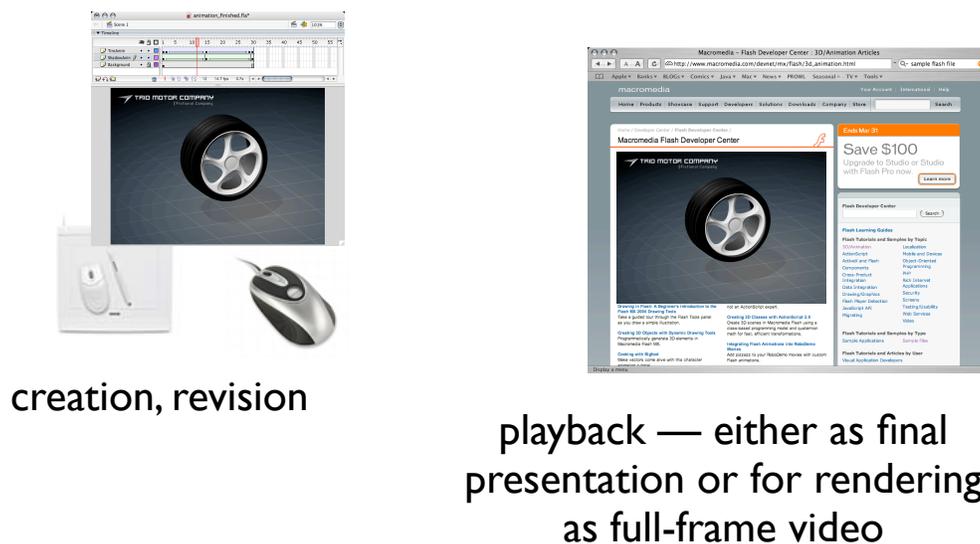
	Full-Frame	Tweened
Editors	Final Cut Pro, Premiere	Flash, PowerPoint
Formats	MPG, MOV, WMV	SWF
Unique Traits	pixel-level control	computer- generated
Related Terms	“DV” “captured”	“object-based” “animated”
Size	Resolution, frame rate	Number of objects

- While we choose the terms “full-frame” and “tweened,” there are no strongly-established terms in the video domain
- As with images and audio, video typically moves from tweened to full-frame, but not vice versa
- For example, computer-animated movies are initially object-based/tweened, but are finally rendered and distributed as full-frame video

Full Frame Video Life Cycle



Tweened Video Life Cycle



Tweening & Computer Animation

- Main principle: the animator defines the endpoints (“I want this object to go from *this* to *that*”) and the computer does (calculates) the rest
- Applicable to both 2D and 3D animation

Current Video Buzzwords

- DV — *digital video*: video storage and communication that is inherently digital
- DVR — *digital video recorder*: device that stores video as files on a disk
- HD — *high definition*: new resolution for video (1280x720 or 1920x1080 as opposed to 768x576 or 640x480)

Video Formats

- In what now should be a common theme with all digital multimedia assets, video ultimately takes the form of numbers that must be interpreted by a computer
- More than any other asset, data size is a paramount consideration with video — there is simply more of it than in any image or sound
- As expected then, *compression* plays a huge role in a video format
- *Quality* is also significant — who wants to watch a tiny, grainy video?
- Video brings in a new consideration: *streaming*. Data can be *streamed* if it can be interpreted and viewed before the entire object (e.g. movie, trailer, clip) is completely available (or downloaded).

	Claim to Fame	“Birthyear”	Typical Use	Tweened?
MPEG-1	earliest open video standard	1989-1992	VCD, general	no
MOV	QuickTime native format	1991	computers	supported
WMV	Windows Media format	1992 (as Video for Windows)	computers	no
MPEG-2	used in today’s digital services	1994	DVD, satellite	no
SWF	Flash animation	1995 (as FutureSplash)	animation	yes
MPEG-4	supposedly “the future”	1998	general purpose	supported
H.263	low-bandwidth stream	1995	video conferencing	no
H.264	very flexible, streamable	2003	general purpose	no

- Of all digital media, video is probably the one that remains very much in flux
- MPEG-4 and H.264 — are still “for future use” (largely), but make some big promises
- MPEG-4 uses H.264 as a video encoder; MPEG-4 encompasses additional elements such as audio and other media objects
- HD seems to be finally taking hold (after being in the Smithsonian for years!)