CGT 353 Lecture 5
Sound in Flash

Introduction

- No surprise that sound is used poorly in Flash
- Important to understand the basics of sound to incorporate them adequately
- Sound files can **sound horrible or be far too large**
- Can use sound for a variety of things including **interactive navigational objects, sound tracks, and voiced narrative**
- In addition to the "drag-and-drop" functionality, you can also control sound with ActionScript
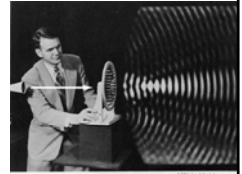

Understanding Computer Audio

- Although we will touch on the fundamentals of sound in lecture, there is much more coverage in the ActionScript text

- As a matter of fact, audio engineering is a highly specialized area that some people build entire careers upon and spend a lifetime learning

- As such, it is beyond the scope of this lecture, text, class, and field to learn it in it's entirety

- Audio can be either **sampled** or **synthesized**

Sampled Audio

- **Sampled audio** - captured analog data that's been converted into digital form
- **Samples** refer to instances of time captured then described digitally
- A digital audio file is an approximated description of multiple samples over a given period of time
- Although not as detailed as analog, its still good enough for humans
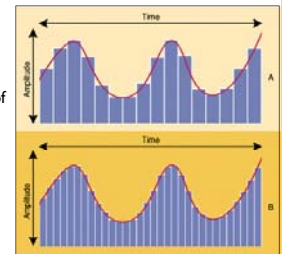
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Synthesized Audio

- Typically refers to MIDI files in multimedia

- Flash cannot use MIDI's, but its important to understand the distinction

- Describes various notes and sounds using a synthesis chip on a computer's sound card

- Because it is recreating rather than replaying sound, synthesized sound sounds "fake"

Sampling Rate

- When sound is recorded, samples are captured at a specific, consistent interval
- How close or far apart these intervals are is called the **sampling rate**
- **Greater sampling rate = more samples captured = increased description of audio**
- So, **higher sampling rate = better audio clarity**
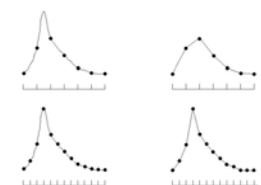
Measuring and Using Sound

- Audio usually measured in kHz (kilohertz)

- Sounds with a sampling rate of 44 kHz are "CD quality"

- Human ear can hear up to 20-22 kHz, so its usually not necessary to have 44 kHz on a multimedia file

- Should never go lower than 11 kHz, which is adequate for voice but not for music

- In Flash, its best to start with high quality files then use Flash to downsample them

Bit Depth

- At each captured sample, the computer has to represent the audio amplitude with a certain number of bits, described as **bit depth**

- Bit depth controls audio **fidelity or dynamic range**

Sampling for Flash Multimedia

- For Flash, sampling at 22kHz, 16 bit depth is usually fine

- Again, it depends on what you want to do with the audio

- Avoid using multichanneled sound whenever you can in Flash

For this Class

- You will not be expected to become experts in sound sampling or editing

- However, you will have to show proficiency at incorporating sound into Flash

Importing Sound

- Can either import or drag sound into the Flash library

- You can then assign a sound to any frame in Flash

- These frames can be in any timeline (main, movie clip, etc) but will not work in a graphic symbol

Import Formats

- Each audio format uses a variety of compression/ decompression schemes known as **codecs**
- Must usually have a particular codec to play a particular format
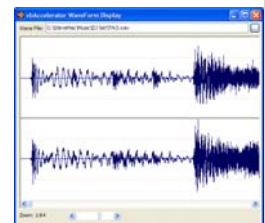
Import Formats

- Once Flash imports a file, the codec "wrapper" is stripped and the file is stored as a generic **PCM (Pulse Code Modulation)** file

  - **MP3 / MP4** - cross-platform files with extremely good compression and general availability
    - Created by the Motion Picture Experts Group
    - Strips files of excess data that humans cannot hear
    - As a result, files can be reduced to nearly 1/12 of their original size with no loss in quality
  - **WAV** - the reigning PC Windows audio standard for nearly two decades, still the primary PC acquisition format
  - **AIFF** - (Audio Interchange File Format) primary Mac acquisition format
  - **Quicktime** - audio files (.qta or .mov)
  - **Sun AU** - the native sound format for many Solaris and Unix systems

Sound Settings

- Can control any sounds sampling rate and compression scheme

- Use either the Publish Settings or individual file settings in library

- **Publish settings will override library settings unless individual sound settings have been applied**

- However, **Publish settings can be made to override indv. settings**

Compression

- Flash can use either
  - **linear (RAW)**
  - **speech (ADPCM)**
  - **MP3 compression**

- Default uses no compression (linear)

- Speech is designed for the human voice with several sampling rates, but typically use 11 kHz - converts all sounds to mono

- MP3 typically offers the best compression although ADCPM is not bad

Compression

- Both are lossy compression schemes

- Amount of data lost depends on
  - Size of the averaged data chunks - **subsampling**
  - Amount of averaging that occurs – **quantization**

- **Bit rate** setting allows you to control the size of the compressed chunks

- **Quality** controls the quantization amounts

What the Heck Does This Mean to Me?

- With low bit rate settings, the sound will stream faster, but the overall file size will be bigger as compression is not as effective

- With high bit rate settings, the sound will stream slower, but overall file size will decrease as compression is enhanced

- **Fast quantization** means that compression is increased and files are smaller, but quality is poorer

- **Best quantization** means that compression is decreased and files are bigger, but sound quality is better

Sync'ing Sound

- Not as precise as we would like with Flash due to the dependence on variations in the end users computer
- Sound is time based, where animations are frame based
- Unlike AVI, Flash will not drop sound fragments if the end-computer is slow
- So the machine affects the animations, but not the sound
- So graphics may occur too fast or too slow to keep pace with the audio
- Flash DOES offer some synchronization controls, but there are many "workarounds" that developers have had to utilize

The Properties Panel: Event and Streaming Sounds

- Basic difference is that event sounds have to be downloaded before they can play, whereas streaming sounds can begin immediately

- Events sounds also play independently of the timeline, where streaming can be sync'd to the timeline

Event Sounds

- An event sound will play even if the main timeline is stopped

- The problem with event sounds is that if the frame they're in is "hit" more than once, you can get multiple instances of the same sound playing

- Using "**start sync"** (which is actually a modified event sound), the sound will play only once, even if the frame is "hit" more than once

- "**stop sync"** will stop all other instances of that sound playing before it plays

Streaming Sounds

- Can play almost immediately because they are chopped up into chunks of sound in a process called **interleaving**

- Problem with streaming sounds is that if the downstream slows the sound may cut

Other Differences

- Event sounds work just like symbols in Flash in that multiple instances work like copies that do NOT add to the overall file size.

- Streaming sounds however, do not and will increase the size for each time they are added to the movie

- Streaming sounds can be scrubbed through on the timeline

Sound Effects and Looping

- Flash can do a limited number of sound effects in the Properties panel

- However, these edits do not manipulate the sound in the .swf, so you should do some edits beforehand in a program like SoundForge

- Can also loop sounds a maximum number of 999 times

Stop All Sounds - stopAllSounds() – (AS 2.0)

- ActionScript function that will cancel out any existing sounds

Stop All Sounds - AS 3.0

- flash.media.SoundMixer.stopAll() is the basic equivalent of stopAllSounds()
- Many more options for sound in AS 3.0
  - Sound Class
  - SoundEvent Class
  - SoundChannel Class
  - SoundLoader Class
  - SoundTransform Class
  - SoundMixer Class
  - Microphone Class