RADFORD UNIVERSITY

ITEC 120

Lecture 19
Sound (2)

Review

- Sound
  - How does it work in real life?
  - What are the different types of waves that represent sounds?
  - How are musical notes played on computers?

Sound

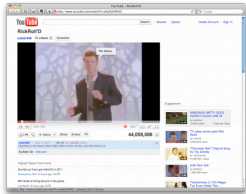## Objectives

- Move beyond simple notes
- How do you work with

You **Tube**
Broadcast Yourself ™

Sound

Files

- Wav files are easy to work with
- Not everything is wav
- Need to convert…

Sound

Conversion Process

- Find a youtube video
- Figure out where your temporary internet cache is
- Find the video in the cache (find the big file)
- Run it through mplayer
  - mplayer -vo null -ao pcm:fast -ao pcm:file=test.wav
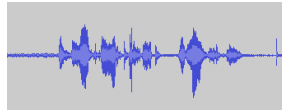- Use the wav file as you see fit

Sound

Loading a sound

- Java throws exceptions
  - Doesn't handle when something goes wrong
  - Expects you to

```
Sound a=null;
try
{
    a = new Sound("echo.wav");
}
catch (Exception e)
{
    System.out.println(e);
}
```

Sound

Manipulating volume

- Increasing
  - Usually doesn't work (clipping)
- Decreasing
  - Create a background track (30% of original volume)

```
for (int i=0; i<sound.getLength(); i++)
{
    int value = sound.getSampleValueAt(i);
    sound.setSampleValueAt(i, (int)(value*.3));
}
```
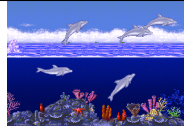
Sound

Effects

- Reverse the sound

```
Sound b = new Sound(a); //Create a sound that is the same size
int c=0;
for (int i=a.getLength()-1; i>0; i--)
{
    b.setSampleValueAt(c, a.getSampleValueAt(i));
    c++;
}
b.blockingPlay();
```

Sound

Echo

```
Sound a;
try
    {  a = new Sound ("echo.wav"); }
catch (Exception e)
    { }
int delay = 10000;
for (int i=delay; i<a.getLength(); i++)
{
    a.setSampleValueAt(i,(int)(a.getSampleValueAt(i) +
                          .6*a.getSampleValueAt(i-delay)));
}
a.blockingPlay();
```

Sound

Blending

- Two sounds to make one
```
Sound a=null;
Sound b=null;
try {
    a = new Sound("testing.wav");
    b = new Sound("ooo.wav");   }
catch (Exception e) {System.out.println(e); }
Sound c = new Sound(a);
for (int i=0; i<c.getLength(); i++)
 {
    double val1 = a.getSampleValueAt(i)*.5;
    double val2 = b.getSampleValueAt(i)*.5;
    c.setSampleValueAt(i, (int)(val1+val2));
}
c.blockingPlay();
```

Sound

Splicing

- How would you combine 2 different wav files into 1 wav file
- What is this called by the average person?
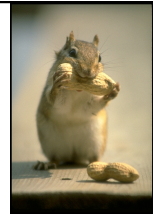- How does this relate to arrays?

Sound

Chipmunks

- Double the frequency
```
Sound b = new Sound(a.getNumSamples()/2+1);
int c=0;
for (int i=0; i<a.getLength(); i+=4)
{
    b.setSampleValueAt(c, a.getSampleValueAt(i));
    c++;
}
b.blockingPlay();
```

Sound

Lengthen it

- Lower the sound

```
Sound b = new Sound(a.getNumSamples()*2);
int c=0;
for (int i=0; i<a.getLength(); i++)
{
    b.setSampleValueAt(c, a.getSampleValueAt(i));
    b.setSampleValueAt(c+1, a.getSampleValueAt(i));
    c+=2;
}
b.blockingPlay();
```

Sound

Problem

- Time shifts
  - Songs are half as long
  - Songs are twice as long
- Why?
  - Easy way out (fits on a ppt slide)
- The right way
  - Phase vocoder
  - Fast Fourier Transforms (Sophmore->Senior)
  - 500+ Loc just for the math library

Sound

Example

- Audacity – Software that does it the right way
  - 38k+ lines of code for handling audio

Sound

Other effects

- Bass boost
- Fade in / out
- Speed up / slow down
- Pop / Hiss removal
- All possible with array manipulation!
  - Not quite as easy to implement though

Sound

Exam review

- Sections
  - True / False
  - Short answer
  - Error detection / Correction
  - Designing Solutions
  - Interpreting Code

Sound

Summary

- More uses for sound
- Exam review

Sound