



Introduction

In this assignment, we will explore the basics of working with digitally sampled audio. Audio libraries are usually structured using either a *push* model or a *pull* model. In a push model, you, as the programmer, compute some audio samples and then call some function in the audio API that schedules the samples for playback. With a pull model, you register a callback (i.e., a function) that gets called every time the audio device needs more samples to play. You then provide the requested number of samples in that function.

Task

Starting from the skeleton Xcode project, implement two versions of the `tonegen` utility: one using the push model, and the other using the pull model. Your program should output a 440 Hz sine wave for 2 seconds, and then exit.

The skeleton Xcode project uses Port Audio, a cross-platform library written in C for working with digital audio.

Answer the following questions:

1. Describe the advantages and disadvantages of using the push model vs. the pull model when writing an audio application. Do you feel one is superior over the other? Justify your answer.
2. How large was the buffer size you chose? What are some factors that would influence your choice of the buffer size?

Additional Credit

Credit above 2.0 will be awarded for one or more of the following:

- Plot out the effects of buffer size on CPU usage. You may find the “time” command-line utility useful.
- Add some interactive component to your program; for example, pressing various different keys to generate different frequencies of sine waves, and/or options to generate square waves, sawtooth waves, etc...
- Anything else that you feel would add more polish to your program.

Submission

Submit a zip archive of your Xcode project to `eric@cs.rwth-aachen.de` by **Sunday, November 19, 2006 at 23:59**. Remove the “build” folder in your project before submitting. You should also include a README file (plain text or pdf) that includes the names of you and your group member (s), a brief summary of what you accomplished, and answers to the above questions.