HÖGSKOLAN
I HALMSTAD

Verónica Gaspes
Halmstad University
April 24, 2015

Advanced object oriented programming
Project description

Introduction

As part of the requirements to pass the course you have to do a programming project. You will need to demonstrate what you have programmed, and you have to write a report and make a presentation for the rest of the class.

This document describes the project you will work with. You will have to develop a framework and write a trivial and a non-trivial application based on the framework. The purpose of the applications is to demonstrate how to use the framework.. Chapter 8 in the course book is a good starting point to understand what a framework is, there are explanations and examples. We discussed two frameworks with applications during week 4 and assignment 4 was dedicated to yet another framework.

Practicalities

You have to work in pairs, in the same groups that you formed for the assignments. You can book a supervision pass per week by emailing your supervisor. You need to prepare the questions you want to ask, supervision is based on your questions. You have four weeks to work on the project. During week 22 and/or 23 you will need to make the demonstration and the presentation and you will have to hand in a report.

In order to pass the course it is enough with a well enough designed and implemented framework and the trivial application. For better grades you will need a better designed framework and the non-trivial application.

The program, the report and the presentation all contribute to your grade.

When you submit the program consider the following:

1. Code should be properly indented and formatted.
2. Code should be documented: think of using pre- and postconditions and representation invariants. Explain the role of the parameters to methods and constructors.
3. Code should not include debugging statements.
4. Do not include `.class` files.

Project: Sound manipulations

In the first programming course you extended a little framework for manipulating images. The framework included a graphical user interface and interface types for filters, scalable filters and picture generators. The framework made use of the data type `Picture` as provided by the authors of the book (professors Robert Sedgewick and Kevin Wayne from Princeton University).

You could imagine a similar framework for manipulating sounds. In this case you will need to work not with pictures but with sounds.

The first thing you need to know is to understand digital audio (digital signal processing). You can start by looking at the section called **Standard audio** in the website (by the same authors)

`introcs.cs.princeton.edu/java/15inout/`

You can access a library class for dealing with sounds provided by the same authors:

`introcs.cs.princeton.edu/java/stdlib/StdAudio.java.html`

In your project you might find it more suitable to work directly with the Java libraries for dealing with sound.

The framework

Design a framework for creating and editing sounds. It should include a graphical user interface that allows you to edit and play sounds, create sounds with a given frequency and a given duration, and put them together into tunes. The framework should also be able to record and playback tunes. You should provide some filters that allow you to create interesting sounds. For example

`en.wikipedia.org/wiki/Karplus-Strong_string_synthesis`

describes an operation that helps in making sounds that resemble plucking on a guitar chord. You should also provide ways of mixing sounds.

The applications

1. Program an application using your framework that plays sounds given as a frequency and a duration.
2. Program an application that has a graphical user interface for creating and transforming sounds.