

# KlassroomSwing – A Stepping Stone To javax.swing

## Contact Information

Dean Sanders  
Northwest Missouri State University  
[sanders@mail.nwmissouri.edu](mailto:sanders@mail.nwmissouri.edu)

## Problem Statement

Computer science educators have always sought the best way to teach programming. Current discussions include consideration of how early object-oriented techniques should be introduced and how early students should be expected to create graphical user interfaces (GUIs). This appears to be a situation where no one is wrong, but everyone needs to make a choice. Regardless of which approach is chosen, two things are clear,. First, the students live in a world of multimedia and graphical user interfaces, but many textbooks, examples, and ancillary materials are rooted in text-based interactions. Second, support materials are important, regardless of the approach that is used. KlassroomSwing was designed as a support tool for those that use an objects-first, GUI-early approach to teaching Java.

KlassroomSwing is a Java package that allows beginning programmers to construct GUIs and to incorporate media into their programs. KlassroomSwing grew out of frustration with existing packages. Various packages provide some of this capability, but none are wholly suitable. Some (e.g. Swing, Java Power Tools) have steep learning curves, some (e.g. BreezySwing) differ from Swing in fundamental ways, and many are too limited in scope. KlassroomSwing was designed to rectify many of these problems

## Solution Overview

KlassroomSwing is a self-contained package that parallels a subset of Java's Swing. Most of the classes and methods are mirror images of those in Swing, but seldom-used methods have been eliminated, some things have been streamlined, and a few new classes and methods have been added. Rather than extending Swing classes, KlassroomSwing makes extensive use of delegation and the façade pattern; thereby simplifying the API and significantly reducing the clutter in the API documentation.

Several design goals guided the development of KlassroomSwing. Understanding the design goals gives insight into the package as a whole. KlassroomSwing should (1) be simple and to the point, (2) be easy to learn, (3) be uncluttered with extraneous (for our purposes) methods, (4) provide support for common widgets, (5) provide support for images, audio, and video, (6) provide support for graphics, (7) be completely self-contained, (8) mirror Java's Swing as much as practical, (9) incorporate additional classes and methods to simplify common tasks, and (10) borrow good ideas from related packages

As of this writing, KlassroomSwing can be partitioned into five sets of features: (1) containers, (2) analogues to Swing components, (3) special components, (4) media support, and (5) utility classes. Additional features are planned for development.

Two classes play the role of containers, KSFrame and KSPanel. The KSFrame has a default size, built-in window closing logic, and specific methods to set the background color and to center the frame on the screen. One adds KSComponents to a KSFrame

directly, rather than to its content pane. The default layout manager for `K JFrame` and `KSPanel` is a `GridBagLayout` with a hidden `GridBagConstraints`.

`KlassroomSwing` contains analogues to most of Swing's user interface components. These are simplified in that they only support a subset of the Swing methods; seldom used methods have been eliminated. Whenever possible the prototypes for `KlassroomSwing` methods are identical to those for the Swing methods. Some `KlassroomSwing` components contain additional methods that are not in their Swing counterparts. For example, there are straightforward methods to add borders to a component.

`KlassroomSwing` has a few special components to provide capabilities that are harder to implement in Swing. The `KSDataField` is an enhanced `JTextField` with methods to get and set text, int values, or double values. It's also possible to specify a label as part of a `KSDataField`. The `KSControl` component provides a synchronized menu item and toolbar button. The `KSDoubleSpinner` and `KSIntSpinner` classes provide standard spinner components (thumbwheels). Neither is directly available in Swing.

`KlassroomSwing` has straightforward support for images and audio clips. An image can be in GIF, JPEG, or PNG format. An audio file can be in AU, WAV, or AIF format.

`KlassroomSwing` has some classes that simplify common tasks. Classes `KSCalendarDate` and `KSClockTime` provide easier ways to work with and format dates and times, respectively. Class `KSDecimalFormat` provides methods for formatting numbers as integers, fixed point decimals, floating point decimals, and percentages.

Additional features are planned for summer 2004. These include mouse and keyboard adapters, dialog windows, and support for playing video clips.

### **Experience with the Solution**

`KlassroomSwing` has been used since August 2003 at Northwest Missouri State University. `KlassroomSwing` is being used in two Java-based courses that are comparable to CS101o and CS102o in Computing Curriculum 2001. As of this writing, `KlassroomSwing` has been used by five instructors and approximately 120 students.

We have sought no empirical evidence regarding the effectiveness of `KlassroomSwing`, but the anecdotal evidence is encouraging. Comments from faculty members have been very positive. Upper-division students who work as tutors and teaching assistants have been envious, wishing that `KlassroomSwing` had been available when they were freshmen. Those who have taught the courses have observed that novices can use `KlassroomSwing` with little difficulty, and that students do not outgrow `KlassroomSwing`. Perhaps the most important observation is that students learn to use `KlassroomSwing`'s simplified API documentation effectively. Next fall we will learn whether or not `KlassroomSwing` really provides a good entry point for learning Swing.

### **API Documentation**

The current API classes and documentation are available at [www.nwmissouri.edu/~sanders/KlassroomSwing/KS.html](http://www.nwmissouri.edu/~sanders/KlassroomSwing/KS.html).

### **Supplemental Material**

Preliminary teaching materials are will be available by August 2004.