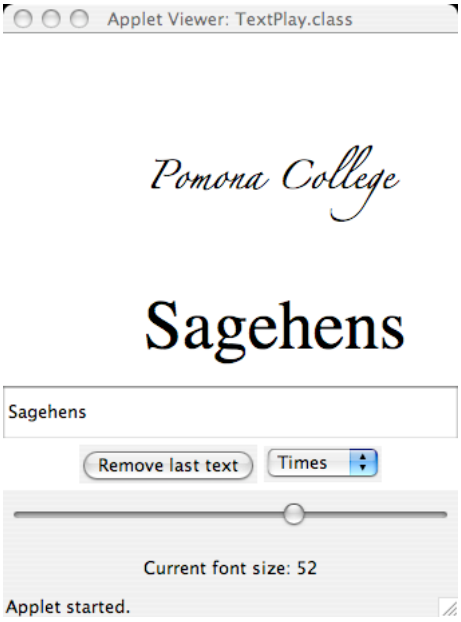
CS 051 Laboratory # 6
GUI Practice

Objective: To gain experience using GUI components and listeners.

—

The Scenario. In this lab, you will play with GUI components, layout management and listeners. You will create a program which includes a `JSlider`, a couple of `JLabels`, a pop-up menu (`JComboBox`), a `JTextField`, and a `JButton`. A picture of the screen can be seen below:



As usual, the center of the screen is the `canvas`. At the "South" end of the screen is a `JPanel` that holds a `JTextField` where the user can write some text to be displayed on the `canvas`, a subpanel that contains two components used to select a font and remove text from the screen. Below that subpanel is a `JSlider` used to control the font size, and below that is a label showing the current font size. The main panel should use a `GridLayout` with four rows and one column as its layout manager. The subpanel uses a simple `FlowLayout`. The components included in the subpanel are a `JButton` that is used to remove the last item written on the screen and a pop-up menu (`JComboBox`) that allows the user to choose from among several fonts (we used "Courier", "Sand", "Zapfino", and "Times").

When the user clicks anywhere on the `canvas`, your program should display the text showing in the `JTextField` in the selected font and font size at the place where the user clicked. When the user adjusts the `JSlider` or selects a new font with the `JComboBox` menu, the last text placed on the `canvas` should change its size or font accordingly. Changing the text in the `JTextField` has no impact on items displayed on the `canvas`.

If the `JButton` is pressed, the last text placed on the canvas should be removed. (You may think of this as a one-level undo. Pressing the button a second or third time will not remove additional items.)

How to Proceed For this lab, you will create an Eclipse project from scratch. See the instructions at `http://www.cs.pomona.edu/classes/cs051/handouts/eclipse-install.html`. Please name your class `TextPlay`.

Before beginning be sure that you open up the GUI cheat sheet from the "Resources" section on the class web site. As a quick reminder, remember the basic steps in displaying components:

1. Construct an instance of the component.
2. Initialize it if necessary (like adding items to a `JComboBox`).
3. Add the component to a `JPanel` or to the content pane of the window controller.

Finally, when you've added all your components, don't forget to call `validate` on the content pane obtained from calling `getContentPane`.

To react to events generated by the user interacting with a GUI component, remember these steps:

1. Declare that the window controller class implements the listener interface for that component, such as `ActionListener`.
2. Implement the method that is called when the user interacts with the component, such as `actionPerformed`.
3. Add the window controller as a listener to the component, calling a method like `addActionListener`.

Note that the statements `import java.awt.*;`, `import java.awt.event.*;`, `import javax.swing.*;`, and `import javax.swing.event.*;` need to appear at the top of your class. These lines inform Java that your program will need access to the standard Java libraries that support GUI components and events (including event listeners).

When you run your program from Eclipse, set the width to 340 and the height to 420.

Here is a suggestion on how to decompose the development of this program into simpler steps.

1. Include code in your `begin` method to add a `JPanel` at the "South" end of the program window. This `JPanel` should use a `GridLayout` having 4 rows and 1 column. Place a `JTextField` in the panel. Make it so that if the user clicks anywhere in the `canvas` then whatever is showing in the `JTextField` is displayed as a `Text` item on the canvas. Make sure that successive clicks on the canvas insert new `Text` items on the screen (showing whatever is currently in the `JTextField`).

   You will want a variable associated with the `Text` item most recently displayed so that you can change its font or font size later. You will associate this name with the current text item in your `onMouseClick` method.

   Since your program does not react to the user typing in the `JTextField`, it is not necessary to associate a listener with this component.

2. Now that you can display text items, start working on adding the components that will let you modify them.

   Start with the `JButton`.

   Add a `JButton` to the panel so that it contains the words "Remove last text". In order to allow your `WindowController` extension to respond when the button is pressed, add the phrase "`implements ActionListener`" to the header of the class. Call the button's `addActionListener` method in your `begin` method to inform the button that your `WindowController` wants to be notified when the button is pressed and add an `actionPerformed` method to your class that performs the appropriate action (removing the text from the canvas) when the button is pressed.

Make sure your program behaves reasonably if the user clicks the button before actually putting any text on the canvas.

3. At this point, there are only two GUI components in the panel you have placed in the south quadrant of your display: the `JTextField` and the `JButton`. Since this panel uses a 4x1 `GridLayout`, there is no room left in the second row to add extra components. To make it possible to add extra components in that row of this `GridLayout JPanel`, you should create a new subpanel to hold the `JButton` you already created and the `JComboBox` component you will create in the next step. Then, add the existing `JButton` to the subpanel rather than to the original panel. After this is done, test the program again. It should work the same except the `JButton` will no longer be stretched to fill the entire width of the window.

4. The next step is to create the `JComboBox` menu that will allow you to choose the font in which the `Text` item is displayed.

   See the GUI cheat sheet for the constructor and the method used to add choices to the `JComboBox` menu. Then add the `JComboBox` menu to the main panel and tell it that your program will be the listener. The `JComboBox` requires an `ActionListener` just like `JButton` does, so you do not need to add an "implements" clause. You do need to modify your `actionPerformed` method to react to menu selections made by the user. Use the `getSource()` method on the event parameter to find out which GUI component the user interacted with. `getSource()` will return either the `JButton` object or the `JComboBox` object. Depending on which value `getSource()` returns, you should either remove the last text from the canvas or change its font.

   To change the font, you can call the method

   ```
   setFont(String fontName)
   ```

   of the `Text` class to change the font used by an existing `Text` object.

5. The last control we want you to add is the `JSlider` to control the font size. As shown on the first page of the handout, we also want you to place a `JLabel` component under the `JSlider` to display the current font size.

   Start by adding a `JSlider` to your main panel just as you added the `JTextField` and subpanel. Place it after the subpanel. Look at the GUI cheat sheet to determine what type of listener a `JSlider` needs. (When you have a class that implements several interfaces, you simply separate the interfaces with commas. Do NOT include the keyword `implements` more than once in the class header!) Define the appropriate listener method so that when the bubble in the scrollbar is moved, the size of the text changes. The possible font sizes should range from 10 to 48.

6. The `JLabel` beneath the `JSlider` should always display the current value represented by the `JSlider`. As shown on the first page of the handout, we want you to display this value preceded by the string "Current Font Size: ". This can be done as usual using the concatenation operator (+) in constructing the string to be inserted as the parameter of the `setText` method of the `JLabel`.

7. Finally, make sure that when the user clicks on the `canvas` the new `Text` item drawn has all the characteristics selected for font and font size. Avoid duplicating the code used to set the font and font size by creating a private method that you can call from several places.

Be careful that your program does not crash if you manipulate the controls after removing the last text item from the canvas or before adding the first text item to the canvas.

Extra Credit If you are interested in earning up to 1 point of extra credit: add the capability of changing the color of your text. There are two ways of doing this, one fairly simple worth half a point, while the other is more complicated and worth the full point:

1. Add a `JComboBox` menu with the names of colors (*e.g.*, black, red, blue, green, yellow). Make "`this`" a listener for that choice item. Update your `actionPerformed` method to change the color of the text when the user uses the color menu. This is worth .5 points.

2. A more flexible way to control the text color would be to use a set of three sliders. You could do this by adding three more `JSlider`s to your display. This is worth 1 point.

Submitting Your Work Before submitting your work, make sure that each of the .java files includes a comment containing your name. Also, before turning in your work, be sure to double check both its logical organization and your style of presentation. Make your code as clear as possible and include appropriate comments describing major sections of code and declarations. Use the Format command in the Source menu to make sure your indentation is consistent. Refer to the lab style sheet for more information about style.

Turn in your project the same as in past weeks; though make sure that the folder name begins with your last name (and includes the lab number).

This lab is due Monday at 11 p.m., though I wouldn't be surprised if most of you completed it during the lab period.

Table 1: Grading Guidelines

Value	Feature
	Style (5 pts total)
1 pts.	Descriptive comments
1 pts.	Good names and formatting
1 pts.	Good use of constants
1 pts.	Good use of private and local variables
1 pts.	Good use of private methods
	Correctness (5 pts total)
1 pt.	Displaying appropriate text at click point
1 pt.	Changing the font
1 pt.	Removing the last text
1 pt.	Changing the font size (and showing its size in the label)
1 pt.	Avoiding null pointer errors