**CSCI 201L Midterm – Programming**
**Spring 2015**
**10.0% of course grade**

For this program, you will implement a GUI with specific actions as explained below. Please name your project `USCUsername_CSCI201_Midterm`. For example, if your username was `ttrojan`, your project would be named `ttrojan_CSCI201_ Midterm`. Read through the entire exam before beginning so you understand what is required.

Your program will allow a user to open an image file, then zoom in or out of the image. The user will choose the file to open with a file chooser dialog box initiated by a menu item, and he will be able to change the zoom percentage with graphical components or a menu item. When your program runs, you will display a GUI that looks like the following:



The size of the window should be the screen resolution of the current computer. Do not hard-code this to the screen resolution you have on your computer – it should be based on the current computer's screen resolution.

The sliders should default to 100 in both the horizontal and vertical directions. This represents 100%, which will be the default size of the image. The scales should go from 0 to 500 in both the horizontal and vertical directions, incrementing by 20. Users should not be able to select values between the major tick marks.

On the File menu, there are two menu items, as shown:
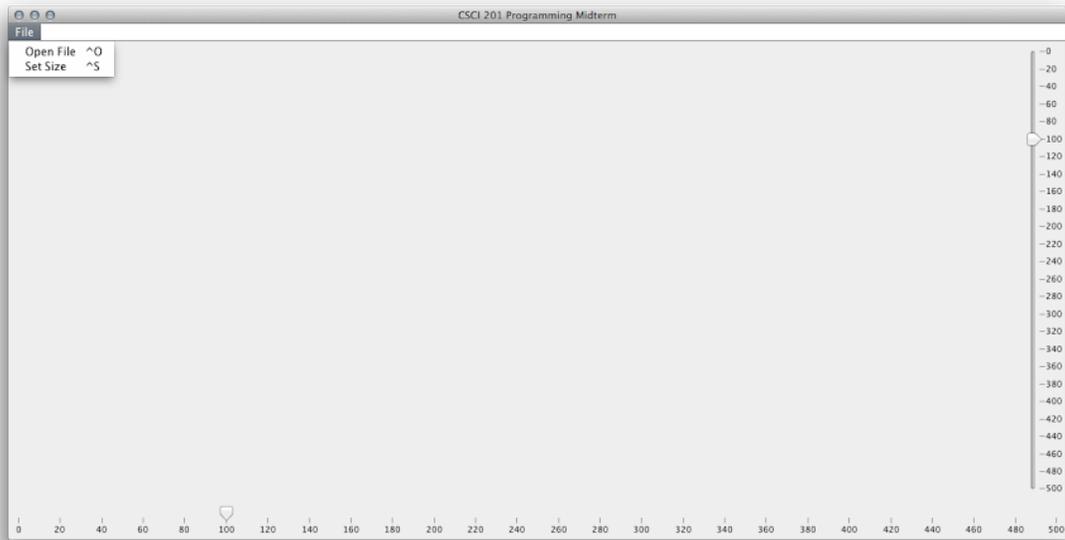


There are accelerators on the Open File (Ctrl-O) and Set Size (Ctrl-S) menu items. These two options also exist as a popup menu when the user right-clicks anywhere in the frame. Even though you don't see the mouse, the popup menu should appear with the top-left corner at the location where the user right-clicked:
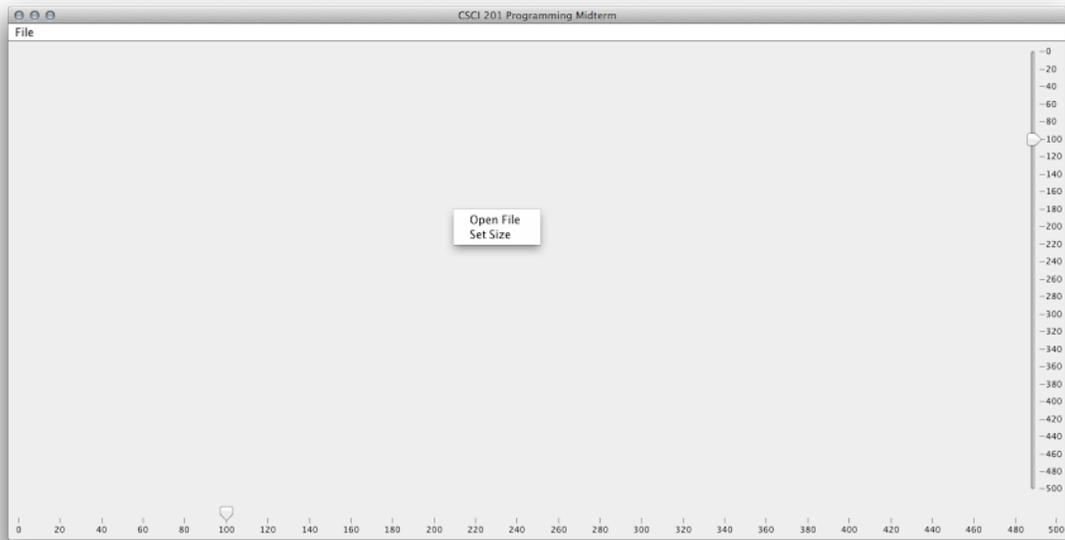
When the user invokes the action for Open File, a file chooser dialog box should be displayed:
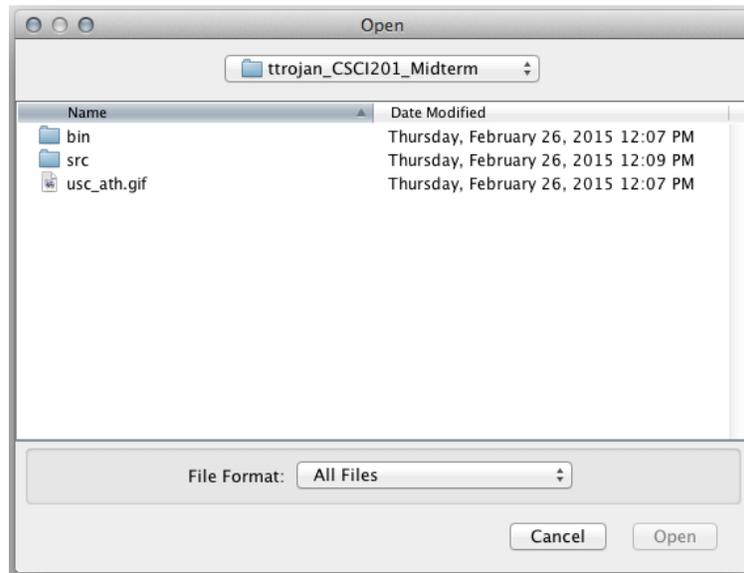


The file chooser should default to the current project directory. (Hint: The directory represented by a period always refers to the current directory.) The user will then select an image file. You can assume the user will only select an image file, so don't worry about validating that. Once an image is selected, display the image as its regular size in the main part of the frame:
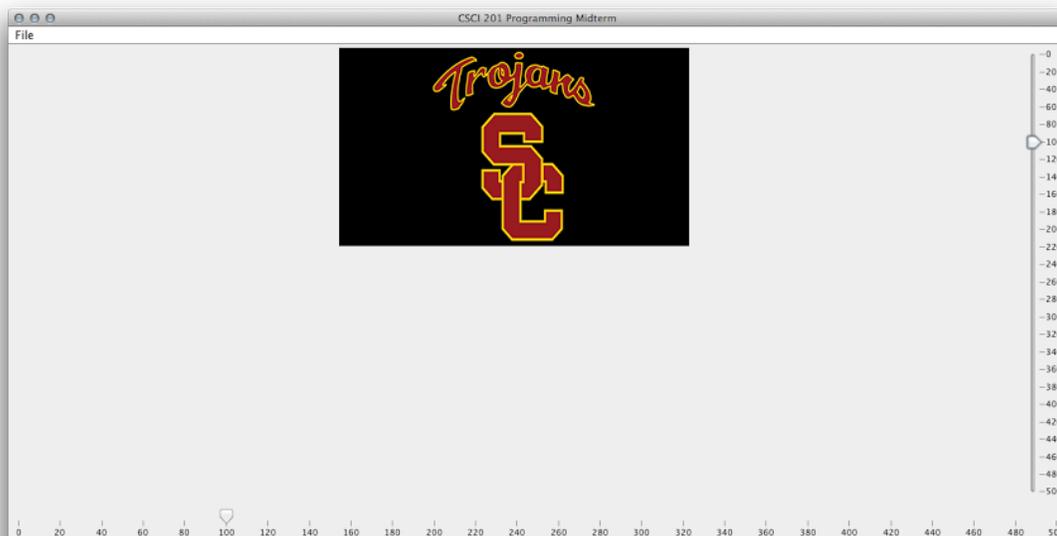
As the user moves the sliders, the image will stretch in the horizontal or vertical direction by that percentage.  For example, if the user moves the horizontal slider to 260, the image would then look like this:
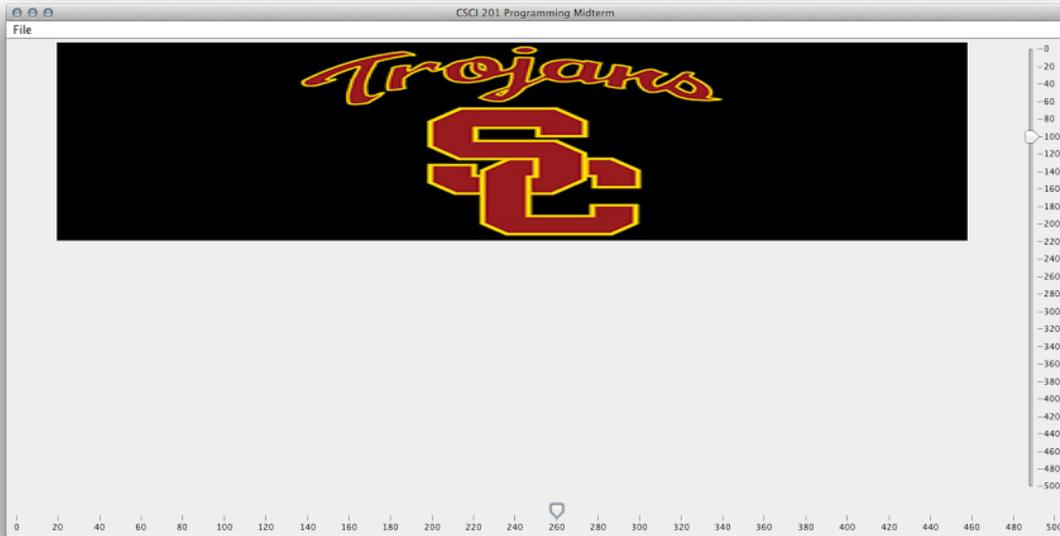


That shows the image acknowledged in the vertical direction as 100% of the original size and in the horizontal direction as 260% of the original size.  If I then make the vertical slider by 40, the image will look like this:
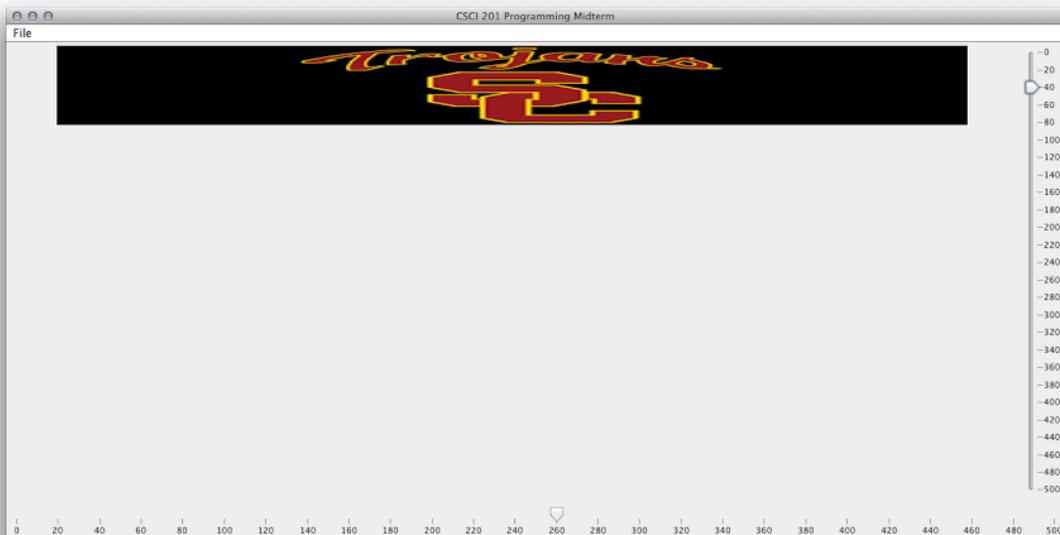
And if I make the horizontal 160 and the vertical 200, the image will look like this:
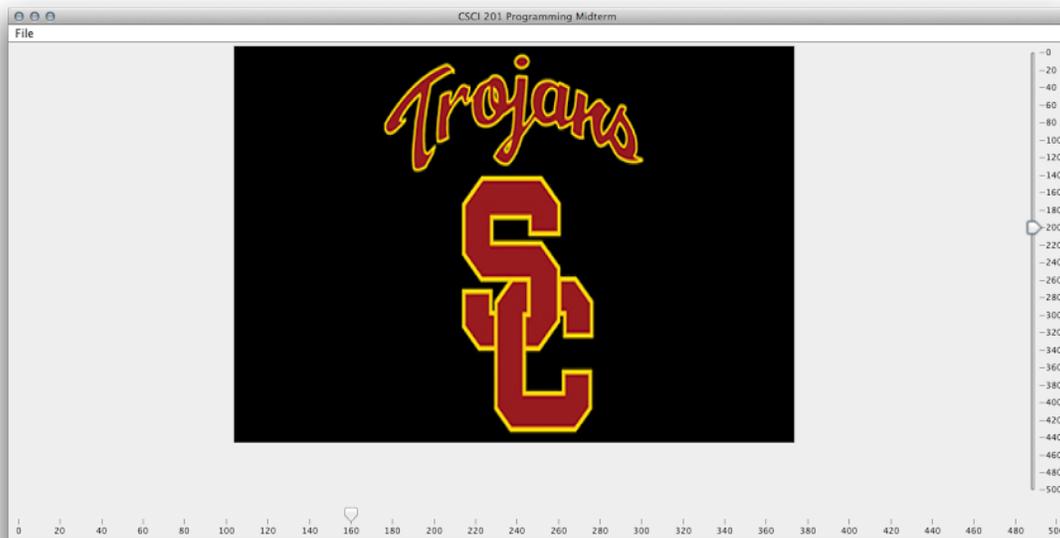


If the image size is too big to fit on the screen, don't worry about it. We could add scroll bars for that functionality, but I am not going to require that for the exam.

When the Set Size action is invoked (either from the menu item in the File menu or the menu item in the popup menu), the following dialog box will be displayed:
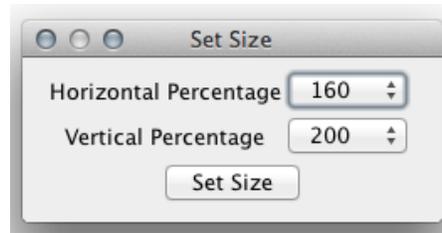


You can display this dialog box anywhere on the screen you want. For your reference, the box shown above has size 250 wide by 120 high. The default values for the horizontal and vertical percentages should be the same as the current values of the two sliders. The drop down lists should display the values from 0 to 500, incremented by 20 (just as is shown in the sliders). When the user clicks the Set Size button, the image will be resized to those percentages, the values of the sliders will change to the new values automatically, and the Set Size dialog box should disappear.

The user should be able to select different images to display, and it will just overwrite the previous image. The sliders should always go back to 100 when a new image is opened.

When the "X" is clicked, the application will exit.

Polymorphism

To ensure that you are using good object-oriented programming, you are provided with the CSCI201ProgrammingMidterm class. This class has been posted on the course web site for you to download. This class will be the parent class of the class you will create. You are not allowed to modify this class at all.

```java
import javax.swing.JFrame;
public abstract class CSCI201ProgrammingMidterm extends JFrame {
    public static final long serialVersionUID = 1;
    public CSCI201ProgrammingMidterm() {
        super("CSCI 201 Programming Midterm");
        initializeComponents();
        createGUI();
        setEventHandlers();
    }
    protected abstract void initializeComponents();
    protected abstract void createGUI();
    protected abstract void setEventHandlers();

    public static void main(String [] args) {
        CSCI201ProgrammingMidterm pm = new ImageFrame();
        pm.setVisible(true);
    }
}
```

I have also posted the USC image used in these screenshots so you can test your program with the same image shown here.

**Grading Criteria**

| % of Final Grade | Criteria |
| --- | --- |
| **1.5%** | **Initial Display** |
| 0.5% | Frame opens to full size of current screen |
| 0.3% | Sliders on vertical and horizontal displayed |
| 0.5% | Sliders display from 0 to 500 incremented by 20 |
| 0.2% | Sliders default to 100 |
| **1.5%** | **Menus** |
| 0.1% | File menu is displayed |
| 0.1% | Open File menu item is on File menu |
| 0.1% | Open File menu item has Ctrl-O accelerator displayed |
| 0.1% | Set Size menu item is on File menu |
| 0.1% | Set Size menu item has Ctrl-S accelerator displayed |
| 0.4% | Popup menu is displayed when right-click anywhere in frame |
| 0.4% | Popup menu is displayed at location of right-click |

| | |
|---|---|
| 0.2% | Open File and Set Size menu items are displayed on popup menu |
| **1.5%** | **File Chooser** |
| 0.1% | File->Open File opens file chooser |
| 0.1% | Ctrl-O opens file chooser |
| 0.1% | Right-click->Open File opens file chooser |
| 0.2% | File chooser defaults to current project directory |
| 1.0% | Selecting an image file opens the image in the main portion of the frame with the initial image size |
| **2.0%** | **Sliders** |
| 0.4% | Sliders only allow user to select values displayed and not values in between the tick marks |
| 0.75% | Horizontal slider expands or reduces the size of the image appropriately in the horizontal direction |
| 0.75% | Vertical slider expands or reduces the size of the image appropriately in the vertical direction |
| 0.1% | No exceptions thrown when horizontal or vertical slider is set to 0 |
| **2.5%** | **Set Size Dialog** |
| 0.1% | File->Set Size opens Set Size dialog box |
| 0.1% | Ctrl-S opens Set Size dialog box |
| 0.1% | Right-click->Set Size opens Set Size dialog box |
| 0.3% | Set Size dialog box looks as shown |
| 0.3% | Set Size dialog box defaults to current values of sliders |
| 0.3% | Drop down lists display values from 0 to 500 incremented by 20 |
| 0.2% | When Set Size button is clicked, Set Size dialog box disappears |
| 0.6% | When Set Size button is clicked, image is resized to the values set in the dialog box |
| 0.5% | When Set Size button is clicked, slider values are changed to the values in the dialog box |
| **0.5%** | **New Image** |
| 0.3% | After an image is being displayed, user can open a different image file and functionality still works |
| 0.2% | When a new image is opened, sliders default back to 100 |
| **0.5%** | **Polymorphism** |
| 0.5% | Code provided was used without modification |