CS112 - INTRODUCTION TO PROGRAMMING

Programming Project #2 - Due Monday, March 1, at the start of class

Purposes:

1. To give you experience writing a Java applet that accepts input from the user.
2. To give you experience with Java arithmetic and the use of the Math class.
3. To give you experience with drawing in Java using the methods of the Graphics class.

Introduction

This project is based on a variant of problems 5.21 and 5.22 in Wu. As you recall, problem 5.21 was the basis for Lab 4 in this course.

What you will do for this project is to create a Java applet that - as a minimum - displays a clock and two input fields labelled "Hours" and "Minutes". When the user enters a time into these fields and presses the "Enter" key on the keyboard, the clock will be set to the new time. Example:

Your program must consist of a minimum of two classes: an applet class and a clock class. The latter will be based on the class you created in Lab 4. The minimal requirement is that you solve the problem as stated above. For maximal credit, you will be asked to make various improvements, as discussed below. You may enjoy looking at several applets the book author has written, available at: `http://www.drcaffeine.com/applets/Clock_applets.html`

After the projects are completed, your applet will be posted on the department's web server so that fellow students, parents, friends, etc. can see what you've created.

Evaluation

Your grade on this project will be based on three criteria:

1. Correct, neat, and visually pleasing operation. (maximum 40-60 points, depending on option chosen)
2. Good methodology, including documentation, use of comments, overall structure, choice of names, and good use of white space to aid readability (indentation and blank lines). (maximum 20 points)
3. A project quiz, to be given on the due date. (maximum 20 points)

A blank project cover sheet is attached and should be stapled to the front of your project submission.

Requirements

Option 1 (Minimal requirements) - maximum 35 points for correct operation

Fulfill the requirements as stated above. Your clock need not be fancy - a circle and two hands is enough. The remaining options presuppose that this option is fulfilled correctly.

Option 2 (Maximum of 10 additional points)

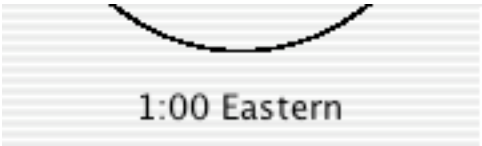
Improve the appearance of your clock in one or more of the following ways:

- Add numbers and/or markers around the face of the clock
- Improve the appearance of the clock hands. We'll discuss possibilities for this in class.
- Use color to make the clock more visually appealing.
- Other creative possibilities of your own devising

Credit will be based on the aesthetics of the finished product. It is more beneficial to do what you do well than to do lots of things sloppily. Maximum credit will require demonstrating that you understand the formulas for positioning hands, markers etc. and that you have learned something beyond what we have explicitly covered in class or lab.

Option 3 (Maximum of 5 additional points)

Each clock should display the time both in digital form and in analog form. The digital time should be displayed before the label, just below the clock. Refer back to the discussion of formatting integers in class to be sure that times are correctly formatted - e.g. 1:03 should be displayed as 1:03, not 1:3 or 01:03. **This must be handled by the clock object - not separately by the applet.** (I.e. the clock object must display the digital time in its `paint()` method. The following illustrates what this might look like:



Option 4 (Maximum of 10 additional points)

North America encompasses a total of 8 time zones - listed here in order from east to west: Newfoundland, Atlantic, Eastern, Central, Mountain, Pacific, Alaska, and Hawaii. Information on converting times between these can be found at `http://atm.geo.nsf.gov/ieis/time.html` (all but Newfoundland) and `http://www.education.gov.nf.ca/liv_rel_time.htm` (Newfoundland Time). Modify your applet as follows:

- Instead of displaying one clock, display eight clocks - each showing the time in a different time zone. The label above each clock should indicate its time zone.

- One clock (Eastern Standard or the time zone of your home) should be displayed noticeably bigger than the other clocks (e.g. perhaps twice as big). The user will input the time in this zone, and the 8 clocks will each be set to the corresponding time in their zone. (Be sure your labelling of the input fields makes it clear to the user what zone the input is supposed to be in.). You don't need to worry about daylight savings time - after all, it's still winter!

If you do this option, you'll need to take into account issues like the fact that the time 1 hour before 1 is 12, and the fact that Newfoundland time differs from EST by 1 hours 30 minutes. Also, give some time to making your overall screen layout aesthetically pleasing.

Implementation Notes:

1. Use absolute positioning to lay out your applet.

2. Since newly created clocks display 1:00, you should set the initial values in your two input fields to 1 and 00. (The constructor for a `JTextField` allows you to specify a `String` parameter that contains the initial value for the field.)

   If you do the multiple clocks option, each clock should be set to show the correct initial time relative to 1:00 in your primary time zone (EST or a different zone you have chosen). (I.e. if your Eastern time zone clock shows 1:00 initially, your Atlantic time zone clock should show 2:00, your Central time zone clock should show 12:00, Mountain 11:00, etc.)

3. Regardless of which option you do, your applet class should be called Project2, and you should create an html file called Project2.html to run it. All files should reside in a folder called Project2.

4. A demonstration of the *functionality* you are expected to achieve if you do all 4 options is accessible from the course web page. Please note that this example does <u>not</u> use color or other features to produce good aesthetics - it simply behaves correctly. (Maximal credit for Option 2 requires more than this), If you go for maximal credit, your project should be <u>both</u> functional and aesthetic. (But a beautiful program that does not work correctly is not a beautiful thing - functionality comes first, then aesthetics!)

Turn in the following, neatly stapled in the order listed:

1. Project Coversheet (attached)
2. Documentation including Problem Statement and Design Document. (Note: you did similar documents in Lab 4, but the ones you turn in with the project should reflect the requirements of this project, not the lab.)
3. Printout of the java sources for the classes you created, and of your html file. Note that you are just to turn in a single program, reflecting the highest option you did. However, you will probably find it wise to attempt options successively, and to save a copy of an option before moving on to the next in the case of catastrophic error.

Leave on server:

Source and compiled versions of the program you turned in, plus html file to run it.

CS112 - INTRODUCTION TO PROGRAMMING - PROJECT TWO

Option(s) - check all that apply: ❑ 1 ❑ 2 ❑ 3 ❑ 4 Author _____

I. Correct Operation / Clear and Neat Output

Points _____

II. Methodology

1.External documentation exhibits clear understanding of the problem and demonstrates good planning for solving it.

Definitely 3 Mostly 2 Partially 1 Not at all 0

2.Prologue comments for files, classes and methods make the purpose of each item clear.

Definitely 3 Mostly 2 Partially 1 Not at all 0

3.Identifiers (class, method, and variable names) clearly describe the item they name and follow OO naming conventions.

Definitely 3 Mostly 2 Partially 1 Not at all 0

4.Features of the Java language and class library are used appropriately and efficiently.

Definitely 3 Mostly 2 Partially 1 Not at all 0

5.Whitespace (indentation and blank lines) follows a consistent convention and makes the overall structure of the program clear by enhancing its readability.

Definitely 3 Mostly 2 Partially 1 Not at all 0

6.Overall methodology results in a program that is easily understandable and obviously correct

Definitely 5 Mostly 3 Partially or not at all 0

Points _____

III. Quiz

Points _____

OVERALL TOTAL (Max 100) Points _____