Software Workshop – Exercises

17 November 2015

Submissions must be made using Canvas, in the following format.

SUBMISSIONS NOT COMPLYING WITH THESE GUIDELINES WILL HAVE 2 MARKS DEDUCTED.

Uploaded file must be: studentid.zip
in the zip format. Rar or tar.gz will not be accepted.

Archive must contain: Easter.java, EasterComponent.java, EasterGUI.java, EasterModel.java, EasterView.java, SliderListener.java, Test.java

All submissions must be made by midnight Sunday. Submissions after this time WILL NOT BE MARKED and will receive ZERO.

The date on which Easter Sunday occurs each year depends on a number of factors (e.g. the phases of the moon).

In the Wikipedia article **http://en.wikipedia.org/wiki/Computus** you can find a lot of information about Easter, including several algorithms for computing which day Easter occurs on in any given year.

This week's exercise is based on the **Anonymous Gregorian Algorithm** which you can find in that article.

Remember to javadoc your classes and methods.

Question 1 [4 marks]

Create a class **`Easter`** with fields for the day, month and year. The constructor should take in the year as an argument and calculate the day and month using the **Anonymous Gregorian Algorithm**. There should be get methods for each field, and a set method for the year that re-calculates the new corresponding date of Easter. Test your program in **`Test.java`**.

Question 2 [4 marks]

Write a model class **`EasterModel`** which has an **`Easter`** object as a field. Write corresponding get methods and a set method for the year (which must notify any observers when a change is made).

Question 3 [4 marks]

Create a class **`EasterView`** which will be an **`Observer`**. It should display the date of Easter for any particular year (see picture).

Question 4 [4 marks]

Create a listener class **`SliderListener`** which will respond to the user moving a slider. It should change the model accordingly.

Question 5 [4 marks]

Write a **`EasterComponent`** class which extends **`JPanel`**. It needs to create all the objects for the user interface and make sure they are connected together correctly. It then needs to add all the visual components (see picture).

Question 6 [4 marks]

Write a class **`EasterGUI`** which contains a **`main`** method. This should create an **`EasterComponent`** object and a **`JFrame`** and put the component on the frame.

Challenge 1

Look up algorithms for calculating the day of the week for any particular date. Implement a program to do this, and a GUI that uses three sliders (one for day, one for month, one for year). Check against a calendar.
https://en.wikipedia.org/wiki/Determination_of_the_day_of_the_week

Challenge 2

Astronomers use a number to represent days called the **Julian Day** – it is the number of days that have passed since the start of the Julian period. Modify your program for challenge 1 to also display the Julian Day corresponding to any particular date.
https://en.wikipedia.org/wiki/Julian_day

Challenge 3

Muslims pray 5 times a day at particular times determined by the sun's position. In addition to the Julian Day, you need to know the lattitude, longitude and time zone of your location. Write a program and GUI that calculates the different prayer times:
http://praytimes.org/calculation/