Systematic Software Development
Week 4 Exercises

1. Draw a UML sequence diagram for when the Start Button is pressed in the reset state

2. Create a copy of the project Stopwatch called (say) LapTimer

3. Design and implement a Lap Timer artefact by modifying the design and implementation of the Stopwatch artefact. The functionality of the lap timer is that an extra button Lap/Resume is provided (you added this button in Exercises 3). When the stopwatch is running, this button can be pressed to freeze the display. Then when the button is pressed again the display resumes displaying the updated time - jumping to the value that it would have reached if Lap/Resume had not initially be pressed. Alternatively, when frozen, the user can press Reset to zeroize the display and take the Stopwatch back to its Reset state.

   (a) Modify the state transition diagram as provided in Week 4 lecture to reflect this behaviour

   (b) Implement changes in the code to achieve this behaviour. You will need to change StopwatchController, StopwatchPanel.

4. Create a class called DisplayOnlyView that implements Observer. DisplayOnlyView only displays a JLabel containing the time updated on its JFrame. You should end up with the two windows: the JFrame associated with StopwatchView (with JButtons and JLabel) and the JFrame associated with DisplayOnlyView (with only a JLabel). Both windows should show the time updating on each of their JLabels. You will need to modify existing code so that both DisplayOnlyView and StopwatchView act as Observers of the ElapsedTimer. Note that you should not need an extra JPanel (i.e. you don't need the equivalent of StopwatchPanel), since the JLabel can be placed directly on DisplayOnlyView's JFrame.

5. (A supplementary exercise). Copy the Stopwatch project into a new project called (say) StopwatchSlider. Design (with changes to the layout and the state transition diagrams) and implement an altered stopwatch that has a slider which allows the user to alter the rate of update of the stopwatch display from 20 msec to 500 msec. The slider could appear above the time display in the artefact. Hint - browse the classes JSlider and ChangeListener.