Exercise Sheet 2

Due: Sunday 03.05.2009, 23:59:59 via SVN

For help, contact aosd-staff@lists.iai.uni-bonn.de (staff only) or
aosd-course@lists.iai.uni-bonn.de (staff and participants).

Please start working on the exercises early enough so that you can contact us in
time in case of problems. Don't expect us to be available during weekend!

Exercise 1: *"cflow"* (5,5 Points)

Are the following equations true? The == operator should be read as "has the same
semantics as". Find a counterexample for each equation that is *not* true.

```
a) cflow(cflow(ptc))          == cflow(ptc)

b) cflow(ptc1 || ptc2)        == cflow(ptc1) || cflow(ptc2)

c) cflow(ptc1 && ptc2)        == cflow(ptc1) && cflow(ptc2)

d) cflow(cflow(ptc1) || ptc2) == cflow(ptc1) || cflow(ptc2)

e) cflow(cflow(ptc1) && ptc2) == cflow(ptc1) && cflow(ptc2)

f) cflowbelow(cflow(ptc))     == cflow(ptc)

g) cflowbelow(cflow(ptc))     == cflowbelow(ptc)

h) cflow(cflowbelow(ptc))     == cflow(ptc)

i) cflow(cflowbelow(ptc))     == cflowbelow(ptc)

j) !cflow(!cflowbelow(ptc1))  ==
   !cflow(ptc2) && (cflowbelow(ptc2) || ptc2)

k) (cflow(ptc1) && !cflow(ptc2)) || (!cflow(ptc1) && cflow(ptc2))
   ==
   (cflow(ptc1) || cflow(ptc2)) && !(cflow(ptc1) && cflow(ptc2))
```

Exercise 2: *"TicTacToe"* (6 Points)

In this exercise you will add some functionality to the well known TicTacToe game.
You will find the game in the "/Sheet2/ES02_E02_TicTacToe" folder in your group's SVN repository.
Implement the following features for the program without changing the Java code.

a) Write an aspect that displays a timestamp with the format "*date – event* " in the console when one of the following events occurs:
  - the game is started
  - a player starts his turn
  - a player sets a new field

  If possible, use only one pointcut and one advice.

b) At the end of the game display a statistic in the console showing:
  - the name of the winner
  - the number of moves
  - the duration of the game in seconds

c) Add a time limit to every move. After 10 seconds the move is over and it is the next player's turn (even if the current player hasn't made any move yet).