Software Design, Modeling, and Analysis in UML

`http://swt.informatik.uni-freiburg.de/teaching/WS2014-15/sdmauml`

Exercise Sheet 4

Early submission: Monday, 2014-12-15, 12:00   Regular submission: Tuesday, 2014-12-16, 8:00

Exercise 1   (5/20 Points)

```
class A {                                  class C {
  public void doA(B b) {b.doB();}            private A itsA;
}                                            private B itsB;
                                             public void doC() {itsA.doA(itsB);}
class B {                                  }
  public void doB() {;}
}
```

Figure 1: Java program.

Propose a UML model corresponding to the Java program [Stevens, 2002] in Figure 1.

Hint: As always, explain your model, discuss your choices, etc. That is, if you follow the proposal of [Stevens, 2002], explain why you do so, if not, why not. Please in particular address the fact that one can identify different "qualities" of relations between objects at run-time. For instance, compare the one between C and B, or the one between B and A when `doA()` is called.

Exercise 2   (7/20 Points)

(i) Give the core state machine corresponding to the diagram shown in Figure 2.   (3)

(ii) Core state machines are defined wrt. a signature. If the core state machine corresponding to Figure 2 is a core state machine wrt. signature $\mathscr{S}$, what can we conclude for $\mathscr{S}$?   (2)

(iii) Core state machines are defined wrt. an expression and an action language. What can we conclude for those two sets from Figure 2?   (2)
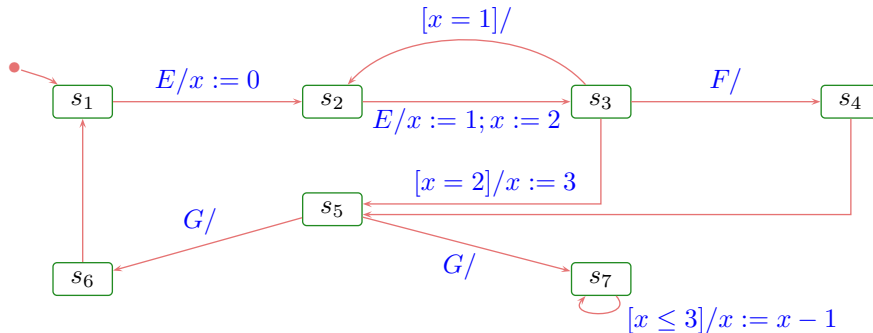

Figure 2: State machine for Exercise 1.

Exercise 3 (8/20 Points)

Let ε be a FIFO which comprises exactly the four events e_1, e_2, e_3, e_4 for an object u in that order (e_1 is first, e_4 is last) where

- e_1, e_2 are instances of signal E,

- e_3 is an instance of signal F, and

- e_4 is an instance of signal G.

Assume e_5 is another instance of signal F and u_2 is an object different from u.
Let

$$\varepsilon' := \ominus(\ominus(\oplus(\ominus(\varepsilon, e_1), u, e_5), e_3), e_2).$$

What is $ready(\varepsilon', u)$ and $ready(\varepsilon', u_2)$?

References

[Stevens, 2002] Stevens, P. (2002). On the interpretation of binary associations in the Unified Modelling Language. *Journal of Software and Systems Modeling*, 1(1).