Exercise Sheet 4

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

Exercise 1  

(5/20 Points)

```java
class A {
    public void doA(B b) {b.doB();}
}

class B {
    public void doB() {};
}

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

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 \( \mathcal{S} \), what can we conclude for \( \mathcal{S} \)? (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)

```
\[
\begin{align*}
E/x := 0 & \quad [x = 1]/s_1
\quad E/x := 1; x := 2 \quad F/x := s_3
\quad [x = 2]; x := 3 \quad G/x := s_5
\quad [x \leq 3]; x := x - 1 \quad G/x := s_7
\quad G/x := s_6
\end{align*}
\]
```

Figure 2: State machine for Exercise 1.
Exercise 3 \hspace{1cm} (8/20 Points)

Let $\varepsilon$ 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

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

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

References