Software Design, Modeling, and Analysis in UML

http://swt.informatik.uni-freiburg.de/teaching/WS2013-14/sdmauml

Exercise Sheet 7

Early submission: Monday, 2014-02-03, 10:00   Regular submission: Wednesday, 2014-02-05, 10:00

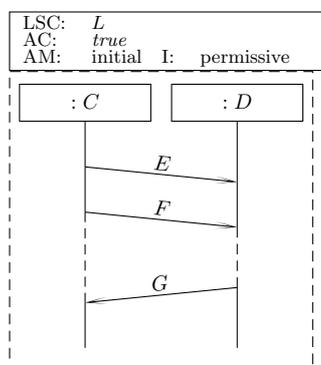## Exercise 1   (10/30 Points)

Figure 1: Requirements in form of interactions.

Consider the LSCs in Figure 1.

(i) Provide the mathematical representation of L.   (2)

(ii) Give one example each for

- universal chart,
- hot location,
- cold condition,
- simultaneous region,
- co-region,
- hot inclusive local invariant,
- activation mode, and
- pre-chart

in Figure 1 (use the terms of task (i), to be more precise).

If there is no example in Figure 1, make up an (as small as possible) own LSC. For your own
example, the mathematical representation is not necessary.   (2)

(iii) What does L (formally) mean?   (3)

(iv) Provide a non-trivial UML model which is *not* consistent with L.
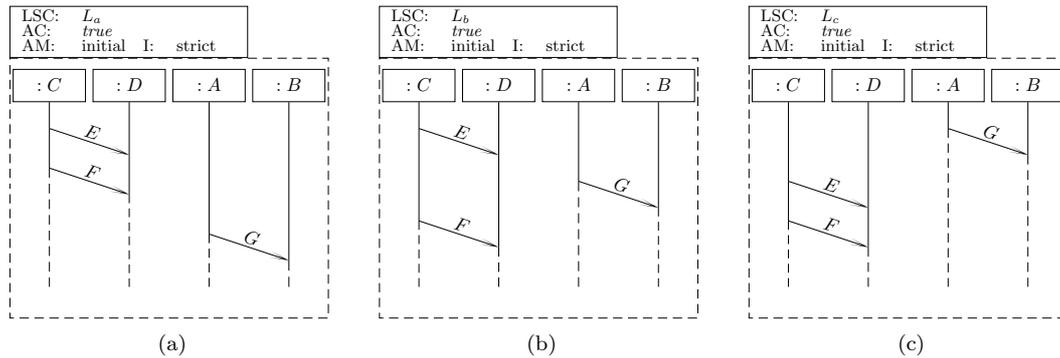(As usual: convince your tutor of the claimed non-consistency).   (3)

Figure 2: Partial order.

Exercise 2 (5/30 Points)

- In the semantics of the lecture, LSCs L_a, L_b, and L_c have the same meaning. If we view L_a, L_b, and L_c as Sequence Diagrams recorded with Rhapsody, they have three different meanings. Explain. (3)

- How would you change the semantics definition of the lecture to represent the "Rhapsody recorded SD" interpretation? (2)
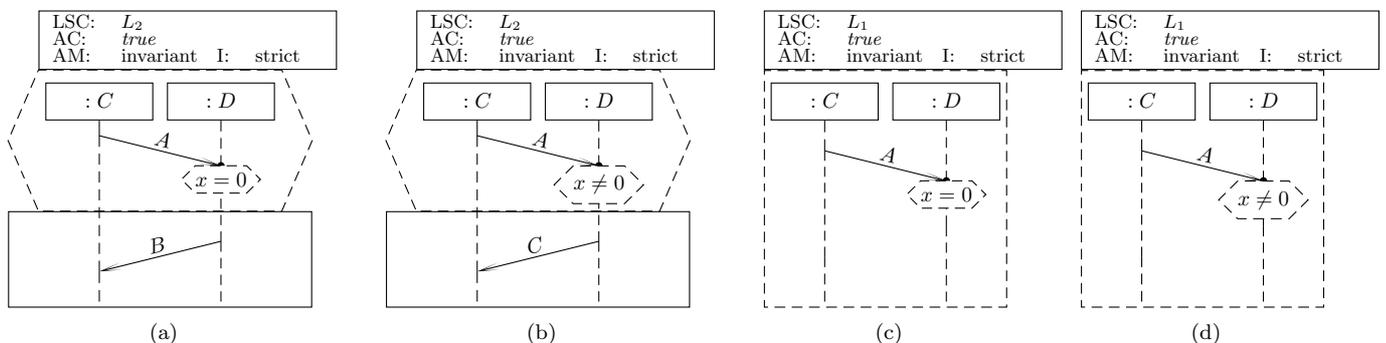
Exercise 3 (5/30 Points)

Figure 3: Requirements in form of interactions.

(i) What requirement is stated by LSC 3(a) alone? (1)

(ii) What requirement is stated by LSC 3(a) and 3(b) together? (1)

(iii) What requirement is stated by LSC 3(a), 3(b), 3(c), and 3(d) together? (1)

(iv) Assume $\mathcal{M}$ is a UML model which satisfies the requirement stated by LSC 3(a), 3(b), 3(c), and 3(d) together. Does $\mathcal{M}$ need to ever send A? And B? And C? And A, B, and C?

That is, does $\mathcal{M}$ need to have a computation path with *Snd*-sets comprising A (B; C; all three, A, B, and C)? (2)

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Exercise 4 (10/30 Points)

Recall Exercise 6.3 which asked for a Rhapsody model of a level crossing system. Please mail your tutor[1] for the assignment of one of the submissions of your colleagues (made anonymous, of course).

Assess (the non-functional) quality and the correctness of the model you're assigned. (10)

Hint:

 (i) *Describe briefly (in your own words) what you've obtained.*

   What is provided by the authors with what intention? Is it adequate for you to understand the model? What is good? What is unclear? Does the model build and run within Rhapsody?

 (ii) *Describe (in your own words) which requirements the authors address.*

   Discuss: are they adequate (why/why not)? Is something missing? Is something too detailed?

 (iii) *Pick at least the safety requirement from Exercise Sheet 4 and assess the model you've obtained for whether the requirement is satisfied or not.*

   If you think that it holds, than provide as many recorded sequence diagrams as needed to make plausible to the tutors why you do think that. Otherwise, provide a counterexample.

 (iv) *What do you like about the overall solution (colour, shape, presentation, architecture, modelling, ..., everything)? Why? What don't you like? Why? (A canonical "why": because it violates a modeling guideline which you can name and because it has the effect which the modeling guideline should avoid.)*

If the model is not executable, please try to fix it given the experience from your own model. In case of unclear points, act in "good-will" mode. If you really get stuck, ask your tutor for help (he will pass questions on to the original authors). If you like, you can also sketch the consequences that a "bad-will" review would have.

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[1]Mail to `albrechr` with the usual informatik.uni-freiburg.de suffix.