

INF5150 Suggested solutions to exercises 9/10-2007

1. As usual we let \mathcal{H} denote the set of all well-formed traces, and \emptyset denote the empty set. \setminus is the symbol for set-minus, so $S_1 \setminus S_2$ denotes the set containing all elements that are in S_1 but not in S_2 . We get

$$[[\text{Ex1}]] = \{ (\emptyset, \{ \langle !e, ?e, !f, ?f \rangle, \langle !e, !f, ?e, ?f \rangle \}) \}$$

$$[[\text{Ex2}]] = \{ (\{ \langle !e, ?e \rangle \}, \{ \langle !e, ?e, !f, ?f \rangle, \langle !e, !f, ?e, ?f \rangle \}) \}$$

$$[[\text{Ex3}]] = \{ (\{ \langle !e, ?e, !f, ?f \rangle, \langle !e, !f, ?e, ?f \rangle \}, n) \}, \text{ where}$$

$$n = \{ t \in \mathcal{H} \mid \text{the first event on lifeline } y \text{ is } !e \text{ and the first event on lifeline } x \text{ is } ?e \} \setminus \{ \langle !e, ?e, !f, ?f \rangle, \langle !e, !f, ?e, ?f \rangle \}.$$

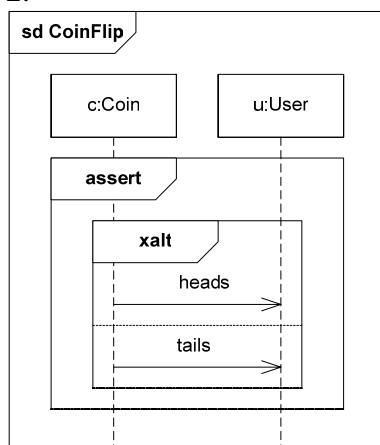
This means that the set n contains all traces where $!e$ is the first event on lifeline y and $?e$ is the first event on lifeline x , except from the traces $\langle !e, ?e, !f, ?f \rangle$ and $\langle !e, !f, ?e, ?f \rangle$.

$$[[\text{Ex4}]] = \{ (\{ \langle !a, ?a, !b, ?b \rangle, \langle !a, !b, ?a, ?b \rangle \}, \{ \langle !c, ?c \rangle \}) \}$$

$$[[\text{Ex5}]] = \{ (\{ \langle !a, ?a, !b, ?b, !e, ?e \rangle, \langle !a, !b, ?a, ?b, !e, ?e \rangle \}, \{ \langle !a, ?a, !b, ?b, !e, ?e, !f, ?f \rangle, \langle !a, !b, ?a, ?b, !e, ?e, !f, ?f \rangle, \langle !a, ?a, !b, ?b, !e, !f, ?e, ?f \rangle, \langle !a, !b, ?a, ?b, !e, !f, ?e, ?f \rangle, \langle !c, ?c, !e, ?e \rangle, \langle !c, ?c, !e, ?e, !f, ?f \rangle, \langle !c, ?c, !e, !f, ?e, ?f \rangle \}) \}$$

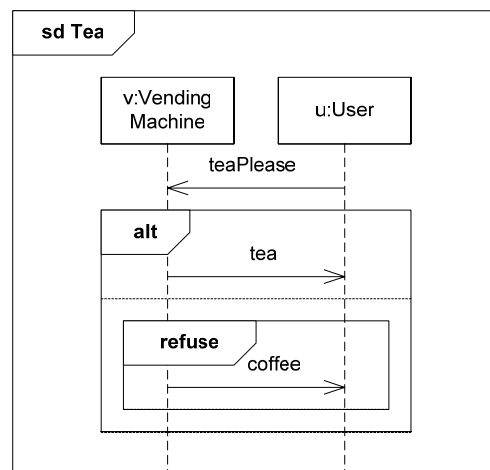
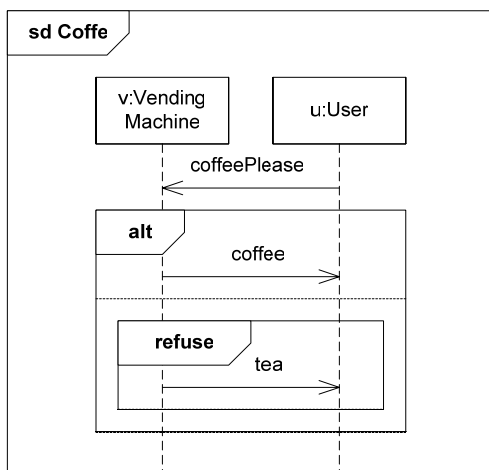
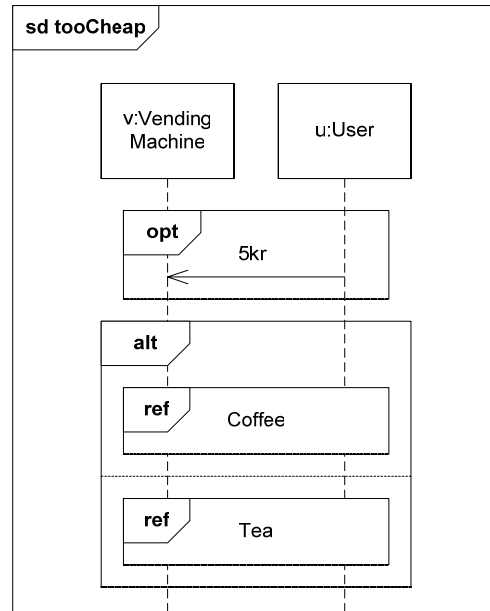
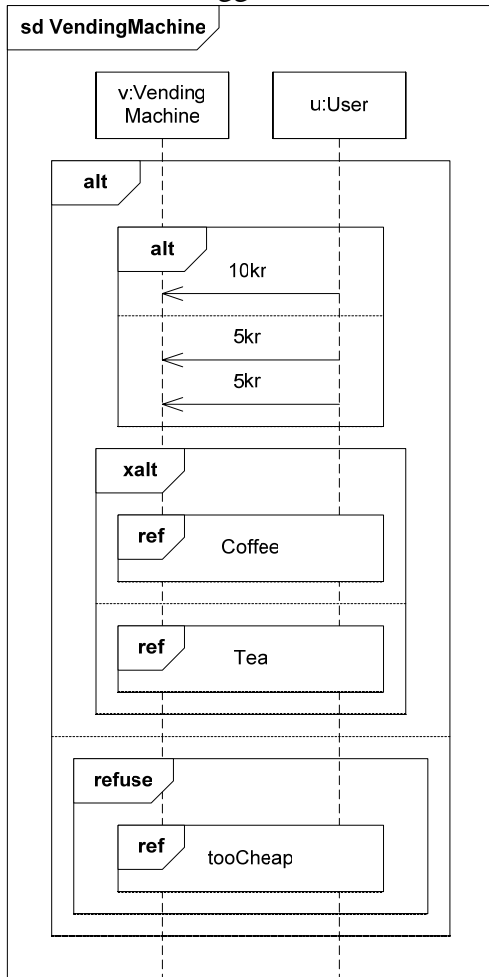
$$[[\text{Ex6}]] = \{ (\{ \langle \text{chk}(\text{att}=7), !a, ?a \rangle \}, \{ \langle \text{chk}(\text{att} \neq 7), !a, ?a \rangle \}), \{ \langle \text{chk}(\text{att} \neq 7), !b, ?b, !c, ?c \rangle \}, \{ \langle \text{chk}(\text{att}=7), !b, ?b, !c, ?c \rangle \}) \}$$

2.



We choose to use limited refinement. This ensures that no new interaction obligations representing other outcomes are introduced.

3. Here is one suggestion:



Note that all traces from the “tooCheap” specification become negative in both interaction obligations in the VendingMachine specification.

4. The mapping L is given by

$L = \{ p:\text{PaymentHandler} \mapsto v:\text{VendingMachine}, d:\text{drinkPreparator} \mapsto v:\text{VendingMachine}, u:\text{User} \mapsto u:\text{User} \}$

Notice that we have broken a UML principle since it is not clear from the diagrams that $d:\text{drinkPreparator}$ and $p:\text{PaymentHandler}$ are parts of $v:\text{VendingMachine}$

