Nils Hagner 4346038 Felix Karg 4342014
Michael Fleig 4340085 Anush Davtyan 4368689

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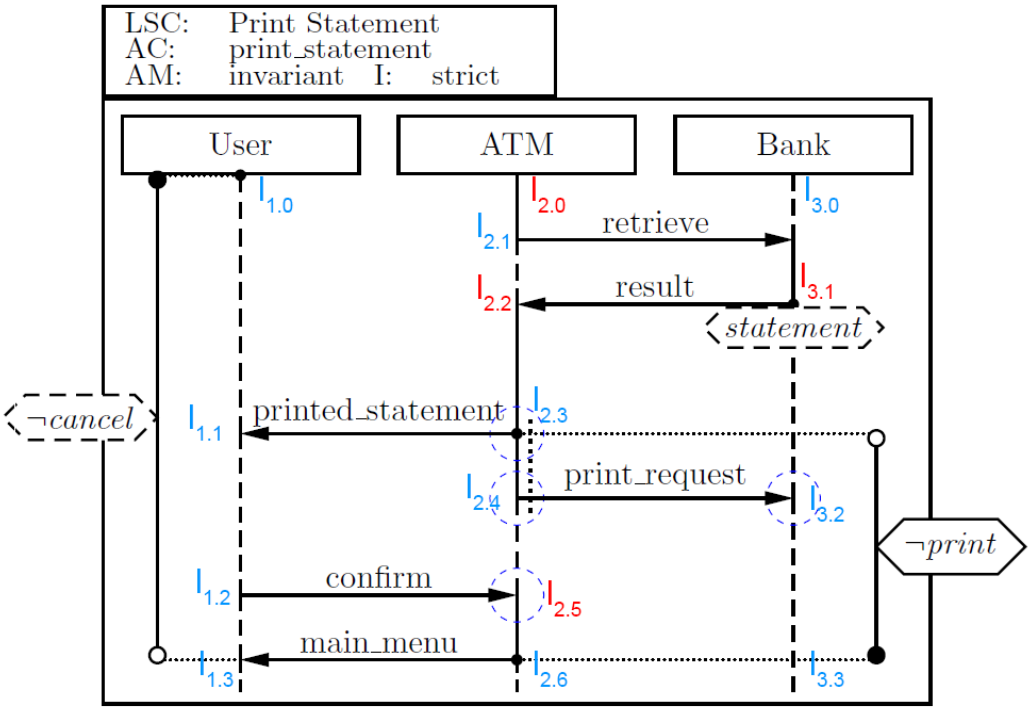
Solutions for Excercise sheet 4

Exercise 1 – LCS Syntax and Semantics

(i) LCS:



a) $\mathcal{L} = \{l_{1.0}, l_{1.1}, l_{1.2}, l_{1.3}, l_{2.0}, l_{2.1}, l_{2.2}, l_{2.3}, l_{2.4}, l_{2.5}, l_{2.6}, l_{3.0}, l_{3.1}, l_{3.2}, l_{3.3}\}$

b) $\mathcal{I} = \{\{l_{1.0}, l_{1.1}, l_{1.2}, l_{1.3}\}, \{l_{2.0}, l_{2.1}, l_{2.2}, l_{2.3}, l_{2.4}, l_{2.5}, l_{2.6}\}, \{l_{3.0}, l_{3.1}, l_{3.2}, l_{3.3}\}\}$

c) $l_{2.4} \sim l_{3.3}$, $l_{2.3} \preceq l_{2.5}$, $l_{2.4} \preceq l_{2.5}$

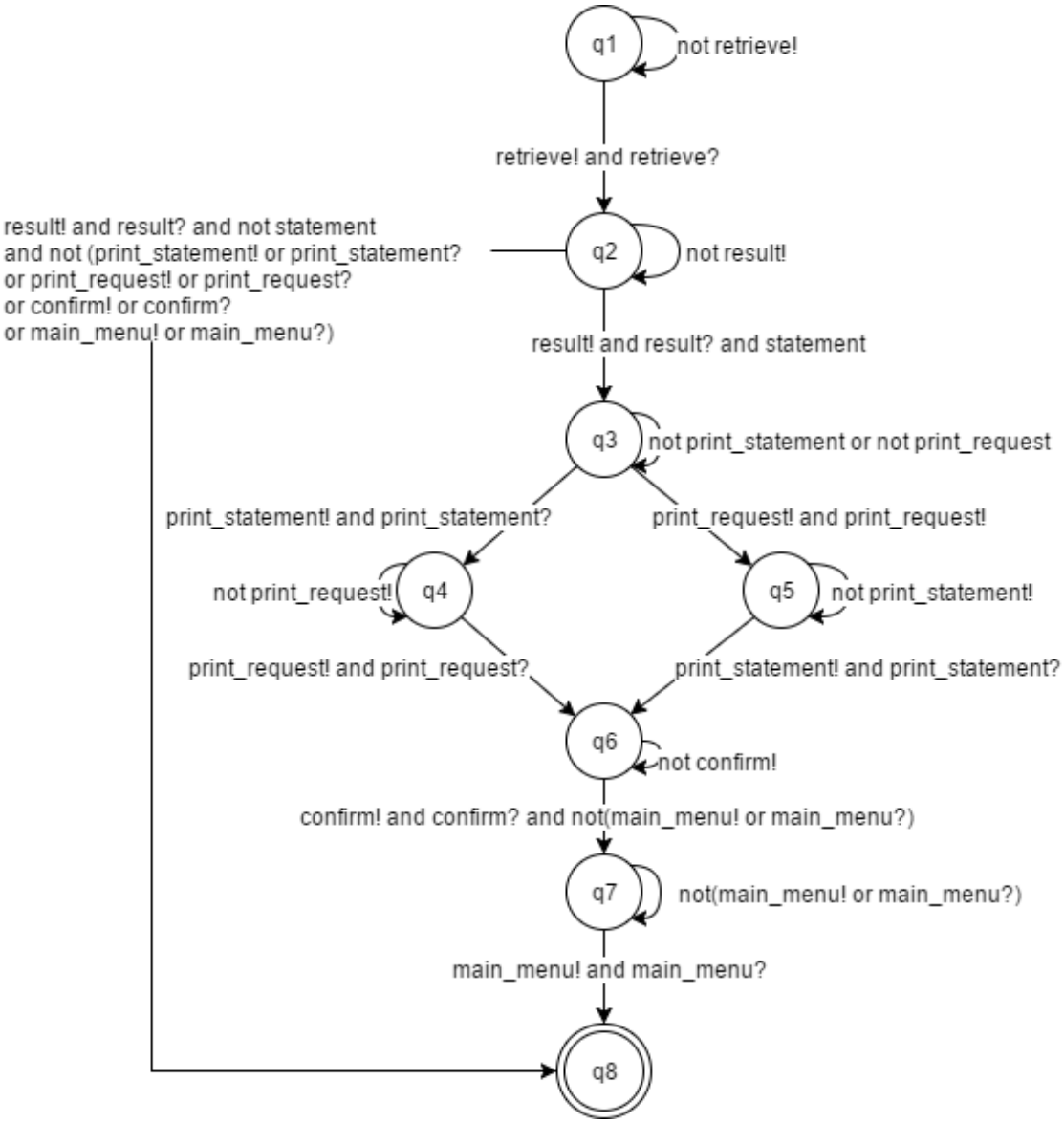
d) Msg: $\{(l_{2.1}, retrieve, l_{3.1})\}$

e) Inv: $\{l_{1.0}, \bullet, \neg cancel, l_{1.3}, \circ\}$

f) Cond: $\{(\{l_{3.2}\}, statement)\}$

(ii) $c_1 = \{l_{1.0}, l_{2.0}, l_{3.0}\}$
$c_2 = c_1 \cup \{l_{2.1}, l_{3.1}\}$
$c_3 = c_2 \cup \{l_{2.2}, l_{3.2}\}$
$c_4 = c_3 \cup \{l_{2.3}, l_{1.1}\}$
$c_5 = c_3 \cup \{l_{2.4}, l_{3.3}\}$
$c_6 = c_3 \cup \{l_{2.3}, l_{1.1}, l_{2.4}, l_{3.3}\}$
$c_7 = c_6 \cup \{l_{1.2}, l_{2.5}\}$
$c_8 = c_7 \cup \{l_{2.6}, l_{1.3}\}$

Abbildung 1: Büchi automaton



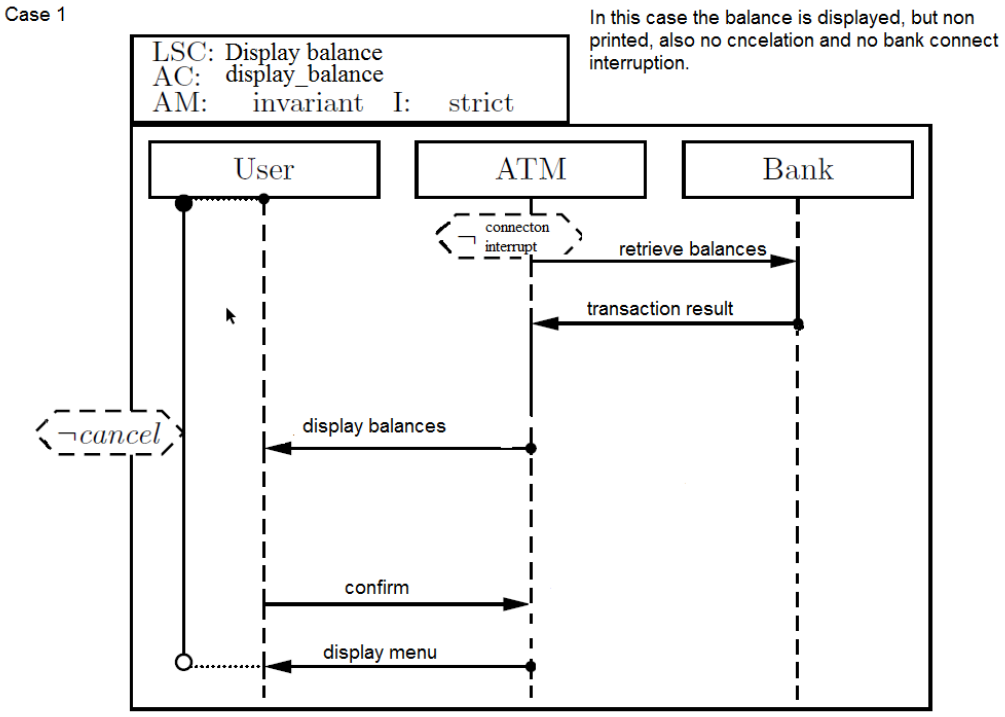
(iii) Strictness conditions omitted for readability.

a) $\pi_{accept} = c_1 \xrightarrow{retrieve! \wedge retrieve?} c_2 \xrightarrow{result! \wedge result? \wedge statement} c_3 \xrightarrow{print-statement! \wedge print-statement?} c_4 \xrightarrow{print-request! \wedge print-request?} c_6 \xrightarrow{confirm! \wedge confirm?} c_7 \xrightarrow{main-menu! \wedge main-menu?} c_8$

b) $\pi_{exit} = c_1 \xrightarrow{retrieve! \wedge retrieve?} c_2 \xrightarrow{result! \wedge result? \wedge \neg statement} c_8$

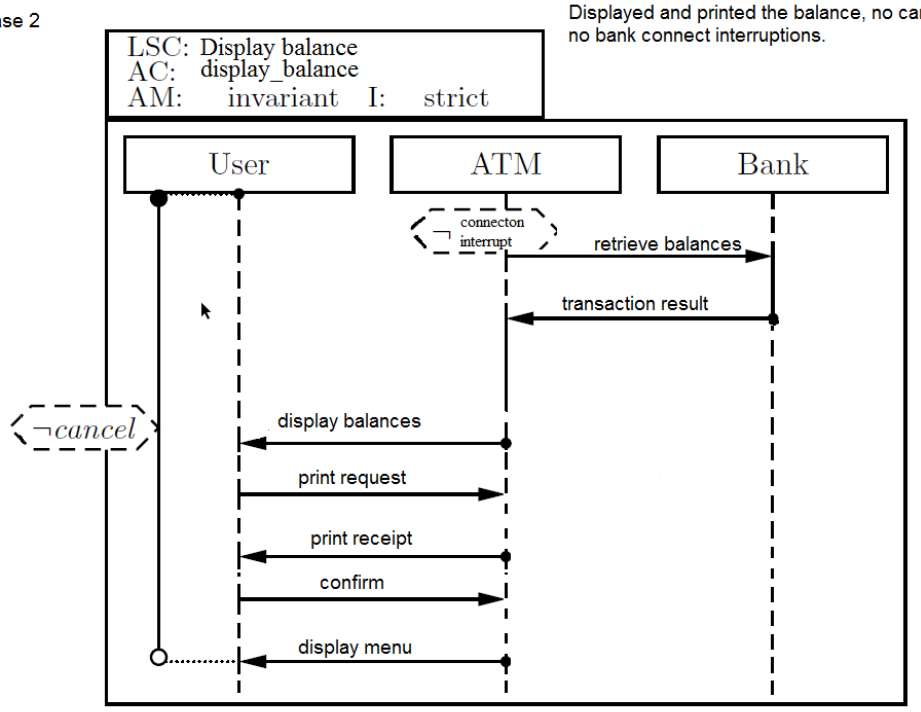
c) $\pi_{violate} = c_1 \xrightarrow{retrieve! \wedge retrieve?} c_2 \xrightarrow{result! \wedge result? \wedge statement} c_3 \xrightarrow{print-statement! \wedge print-statement?} c_4 \xrightarrow{print-request! \wedge print-request? \wedge print} illegal$

Exercise 2



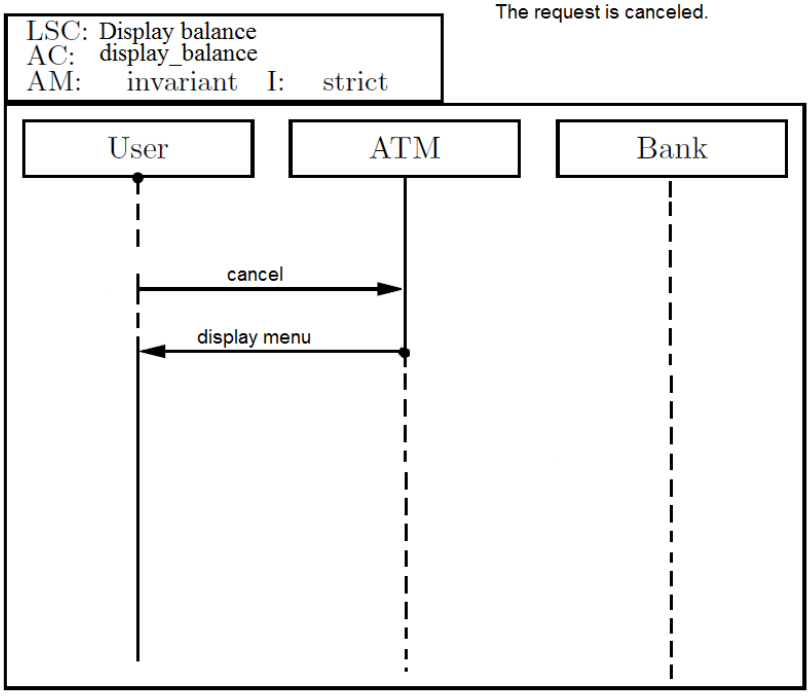
Case 2

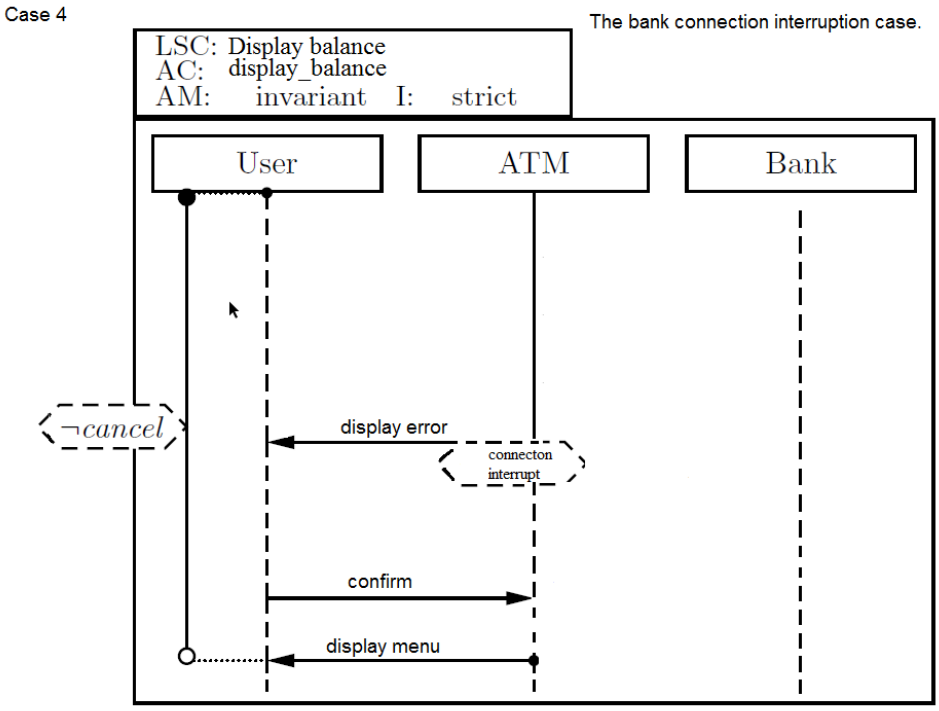
Displayed and printed the balance, no cancelations and no bank connect interruptions.



Case 3

The request is canceled.





Exercise 3

i $\mathscr{S} = (\mathscr{T}, \mathscr{C}, V, atr, F, mth)$ mit
$\mathscr{T} = \{int\}$
$\mathscr{C} = \{TreeNode, Object\}$
$V = \{key : int, leftChild : TreeNode, rightChild : TreeNode, parent : TreeNode, value : Object\}$
$atr = \{TreeNode \mapsto \{key, leftChild, rightChild, parent, value\}, Object \mapsto \emptyset\}$
$F = \{\emptyset\}$
$mth = \{TreeNode \mapsto \emptyset, Object \mapsto \emptyset\}$

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