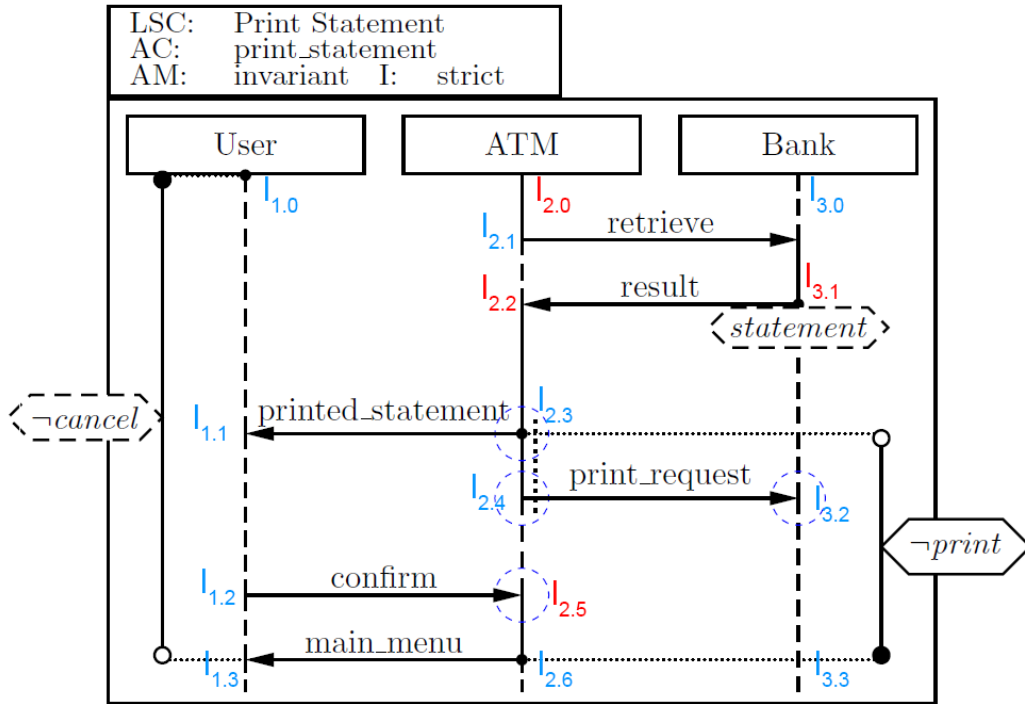


Solutions for Exercise sheet 4

Exercise 1 – LCS Syntax and Semantics

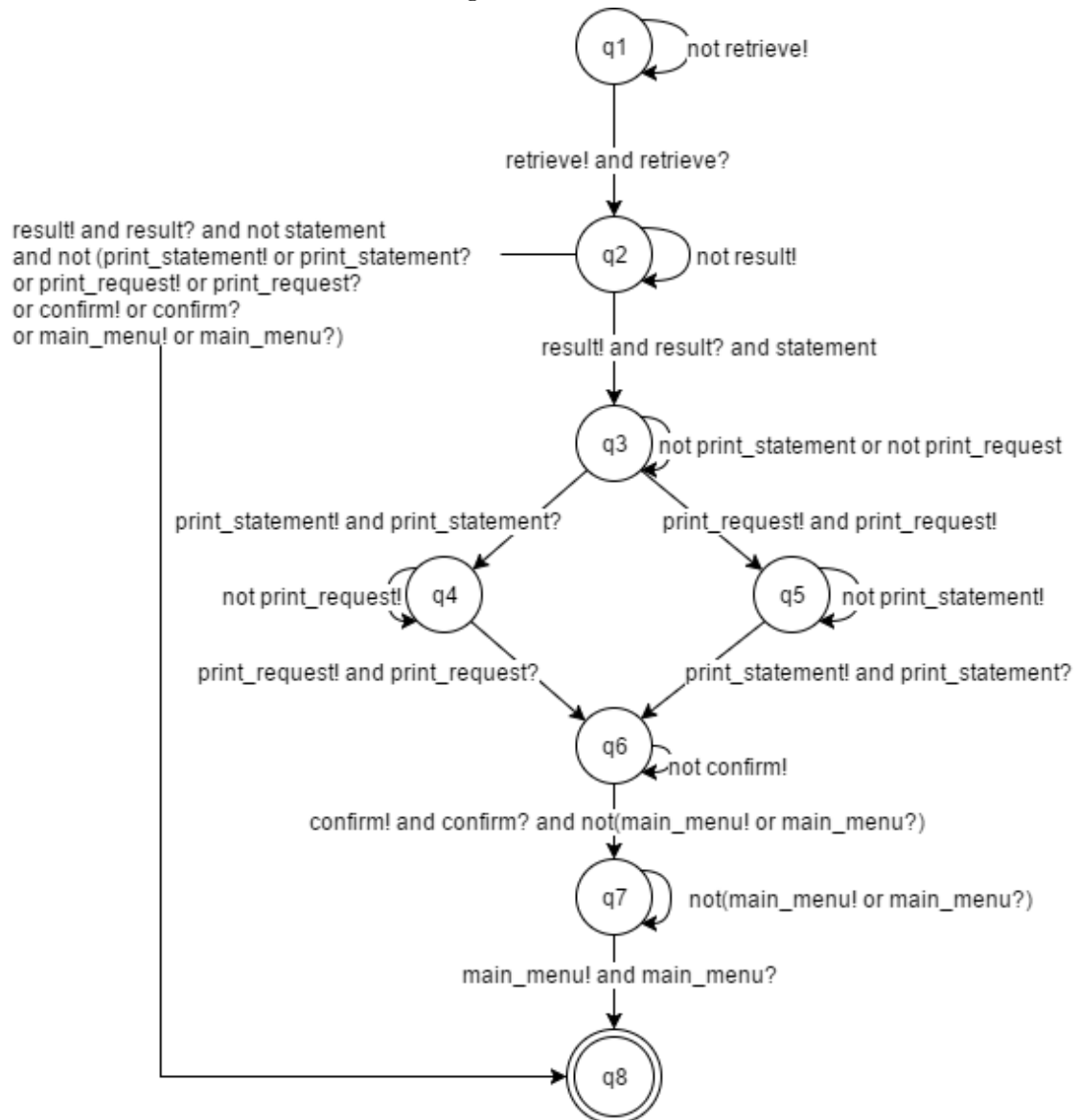
(i) LCS:



- 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) $\text{Msg: } \{(l_{2.1}, \text{retrieve}, l_{3.1})\}$
e) $\text{Inv: } \{l_{1.0}, \bullet, \neg\text{cancel}, l_{1.3}, \circ\}$
f) $\text{Cond: } \{(\{l_{3.2}\}, \text{statement})\}$

- (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.

$$\begin{aligned}
\text{a) } \pi_{\text{accept}} &= c_1 \xrightarrow{\text{retrieve!} \wedge \text{retrieve?}} c_2 \xrightarrow{\text{result!} \wedge \text{result?} \wedge \text{statement}} c_3 \xrightarrow{\text{print-statement!} \wedge \text{print-statement?}} \\
&\quad c_4 \xrightarrow{\text{print-request!} \wedge \text{print-request?}} c_6 \xrightarrow{\text{confirm!} \wedge \text{confirm?}} c_7 \xrightarrow{\text{main-menu!} \wedge \text{main-menu?}} \\
&\quad c_8 \\
\text{b) } \pi_{\text{exit}} &= c_1 \xrightarrow{\text{retrieve!} \wedge \text{retrieve?}} c_2 \xrightarrow{\text{result!} \wedge \text{result?} \wedge \neg \text{statement}} c_8 \\
\text{c) } \pi_{\text{violate}} &= c_1 \xrightarrow{\text{retrieve!} \wedge \text{retrieve?}} c_2 \xrightarrow{\text{result!} \wedge \text{result?} \wedge \text{statement}} c_3 \xrightarrow{\text{print-statement!} \wedge \text{print-statement?}} \\
&\quad c_4 \xrightarrow{\text{print-request!} \wedge \text{print-request?} \wedge \text{print}} \text{illegal}
\end{aligned}$$