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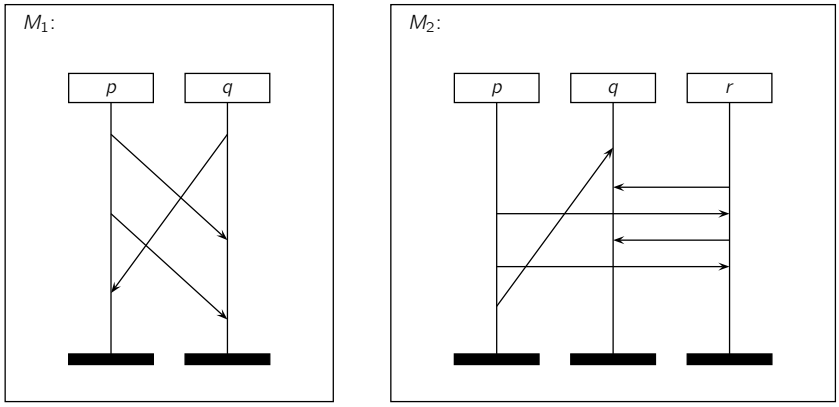
– Assignment 9 –

Exercise 1 (3 points)



Check whether the formulas Φ_1, Φ_2 hold for M_1, and Φ_3, Φ_4 hold for M_2:

1. $\Phi_1 = \exists(\langle \text{proc} \rangle^{-1} \langle \text{proc} \rangle^{-1} \langle \text{msg} \rangle p!q \wedge \langle \text{msg} \rangle q?p)$
2. $\Phi_2 = \forall([\text{proc}] \mathit{false} \wedge (\langle \text{msg} \rangle p!q \vee \langle \text{proc} \rangle q?p))$
3. $\Phi_3 = \exists\langle \{p!q\}; \text{proc}; \text{proc} \rangle [\text{proc}] \mathit{false}$
4. $\Phi_4 = \exists \phi$, where

$$
\begin{aligned}
\phi &= [\text{proc}]^{-1} \mathit{false} \rightarrow \langle \alpha \rangle [\text{proc}] \mathit{false} \\
\alpha &= \big((\{q!p \vee q!r\}; \text{proc})^*; \{q?p \vee q?r\}; \text{proc}; \\
&\quad (\{q!p \vee q!r\}; \text{proc})^*; \{q?p \vee q?r\}; \text{proc}; \\
&\quad (\{q!p \vee q!r\}; \text{proc})^*; \{q?p \vee q?r\}; \text{proc}; \\
&\quad (\{q!p \vee q!r\}; \text{proc})^* \big)^*
\end{aligned}
$$

Exercise 2 (3 points)

Define a PDL formula whose satisfiability set is the set of *race free* MSCs.

Exercise 3 (4 points)

Define a PDL formulas whose satisfiability set is all

1. $\exists$B-bounded CFMs,
2. $\forall$B-bounded CFMs.