

TH2 - Übung 4

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1 CSP Laws

1.1 SCP Laws beweisen

a) $a \rightarrow (P_1 \sqcap P_2) =_T (a \rightarrow P_1) \sqcap (a \rightarrow P_2)$

Gleichheit von Prozessen im Trace-Modell:

\rightarrow zu zeigen: $traces(a \rightarrow (P_1 \sqcap P_2)) = traces((a \rightarrow P_1) \sqcap (a \rightarrow P_2))$

$$\begin{aligned} traces(a \rightarrow (P_1 \sqcap P_2)) &= \{\langle \rangle\} \cup \{\langle a \rangle \frown tr \mid tr \in traces(P_1 \sqcap P_2)\} && \text{Prefixing, 6.10} \\ &= \{\langle \rangle\} \cup \{\langle a \rangle \frown tr \mid tr \in traces(P_1) \cup traces(P_2)\} && \text{Choice, 6.16} \\ &= \{\langle \rangle\} \cup \{\langle a \rangle \frown tr \mid tr \in traces(P_1)\} && \text{Vereinigung von Mengen} \\ &\quad \cup \{\langle a \rangle \frown tr \mid tr \in traces(P_2)\} \\ &= \{\langle \rangle\} \cup \{\langle a \rangle \frown tr \mid tr \in traces(P_1)\} && \text{Idempotenz von Mengen} \\ &\quad \cup \{\langle \rangle\} \cup \{\langle a \rangle \frown tr \mid tr \in traces(P_2)\} \\ &= traces(a \rightarrow P_1) \cup traces(a \rightarrow P_2) && \text{Prefixing, 6.10} \\ &= traces((a \rightarrow P_1) \sqcap (a \rightarrow P_2)) && \text{(Internal-)Choice, 6.16} \end{aligned}$$

□

b) $Skip \triangle P =_T Skip \sqcap P$

Gleichheit von Prozessen im Trace-Modell:

\rightarrow zu zeigen: $traces(Skip \triangle P) = traces(Skip \sqcap P)$

$$\begin{aligned}
traces(Skip \triangle P) &= traces(Skip) \cup \{tr_1 \hat{\smile} tr_2 \mid tr_1 \in traces(Skip) \wedge \checkmark \notin \sigma(tr_1) \quad \text{Interrupt, 6.53} \\
&\quad \wedge tr_2 \in traces(P)\} \\
&= \{\langle \rangle, \langle \checkmark \rangle\} \cup \{tr_1 \hat{\smile} tr_2 \mid tr_1 \in \{\langle \rangle, \langle \checkmark \rangle\} \wedge \checkmark \notin \sigma(tr_1) \quad \text{Skip, 6.4} \\
&\quad \wedge tr_2 \in traces(P)\} \\
&\mid NB_1 : tr_1 \in \{\langle \rangle, \langle \checkmark \rangle\} \wedge \checkmark \notin \sigma(tr_1) \quad \Leftrightarrow \quad tr_1 = \{\langle \rangle\} \\
&\mid NB_2 : \{a \hat{\smile} b\} = \{b\} \Leftrightarrow a = \{\langle \rangle\} \\
&= \{\langle \rangle, \langle \checkmark \rangle\} \cup \{\langle \rangle \hat{\smile} tr_2 \mid tr_2 \in traces(P)\} \quad NB_1, NB_2 \\
&= \{\langle \rangle, \langle \checkmark \rangle\} \cup traces(P) \quad NB_2 \\
&= traces(Skip) \cup traces(P) \quad \text{Skip, 6.4} \\
&= traces(Skip \sqcap P) \quad \text{Choice, 6.14}
\end{aligned}$$

□

1.2 CSP Laws anwenden

$$P1 = ((a \rightarrow c \rightarrow Skip) \sqcap (b \rightarrow c \rightarrow Skip))$$

$$P2 = (d \rightarrow Skip)$$

$$P3 = c \rightarrow d \rightarrow Skip$$

$$\text{zu zeigen: } (P1; P2) \setminus \{a, b\} =_T P3$$

$$\begin{aligned}
(P1; P2) \setminus \{a, b\} &= (((a \rightarrow c \rightarrow Skip) \sqcap (b \rightarrow c \rightarrow Skip)); (d \rightarrow Skip)) \setminus \{a, b\} \\
&=_T ((a \rightarrow c \rightarrow Skip) \sqcap (b \rightarrow c \rightarrow Skip); (d \rightarrow Skip)) \setminus \{a, b\} \quad \text{choice-equiv}_T, 8.15 \\
&= (a \rightarrow c \rightarrow Skip) \setminus \{a, b\} \sqcap (b \rightarrow c \rightarrow Skip) \setminus \{a, b\}; \quad \sqcap\text{-hide-dist}_T, 8.81, NB \\
&\quad (d \rightarrow Skip) \setminus \{a, b\} \\
&= (c \rightarrow Skip) \setminus \{a, b\} \sqcap (c \rightarrow Skip) \setminus \{a, b\}; \quad 3 \text{ x hide-step}_1, 8.79 \\
&\quad d \rightarrow Skip \setminus \{a, b\} \\
&= c \rightarrow Skip \setminus \{a, b\} \sqcap c \rightarrow Skip \setminus \{a, b\}; \quad 2 \text{ x hide-step}_1, 8.79 \\
&\quad d \rightarrow Skip \setminus \{a, b\} \\
&= (c \rightarrow Skip) \sqcap (c \rightarrow Skip); d \rightarrow Skip \quad 3 \text{ x hide-term, 8.85} \\
&= c \rightarrow Skip; d \rightarrow Skip \quad \sqcap\text{-idem, 8.16} \\
&= c \rightarrow d \rightarrow Skip \quad \text{;-unit-l, 8.94} \\
&= P3
\end{aligned}$$

□

2 Failures Semantik

2.1 Stable Failures in Transitionsgraphen