Assignment 11: CCS

ETH Zurich

1 Derivations

By using SOS rules for CCS prove the existence of the following transitions where you assume that $\mathrm{A} \overset{\mathsf{def}}{=} b.a.\mathrm{B}$:

1. $(\mathrm{A} \mid \overline{b}.0) \smallsetminus \{b\} \xrightarrow{\tau} (a.\mathrm{B} \mid 0) \smallsetminus \{b\}$

2. $(\mathrm{A} \mid \overline{b}.a.\mathrm{B}) + (\overline{b}.\mathrm{A}) \xrightarrow{\overline{b}} (\mathrm{A} \mid a.\mathrm{B})$

1.1 Solution

1.

$$\text{RES}\ \dfrac{\text{COM3}\ \dfrac{\text{CON}\ \dfrac{\text{ACT}\ \dfrac{}{b.a.\mathrm{B} \xrightarrow{b} a.\mathrm{B}}}{\mathrm{A} \xrightarrow{b} a.\mathrm{B}} \qquad \text{ACT}\ \dfrac{}{\overline{b}.0 \xrightarrow{\overline{b}} 0}}{(\mathrm{A} \mid \overline{b}.0) \xrightarrow{\tau} (a.\mathrm{B} \mid 0)}}{(\mathrm{A} \mid \overline{b}.0) \smallsetminus \{b\} \xrightarrow{\tau} (a.\mathrm{B} \mid 0) \smallsetminus \{b\}}$$

2.

$$\text{SUM}_1\ \dfrac{\text{COM2}\ \dfrac{\text{ACT}\ \dfrac{}{\overline{b}.a.\mathrm{B} \xrightarrow{\overline{b}} a.\mathrm{B}}}{(\mathrm{A} \mid \overline{b}.a.\mathrm{B}) \xrightarrow{\overline{b}} (\mathrm{A} \mid a.\mathrm{B})}}{(\mathrm{A} \mid \overline{b}.a.\mathrm{B}) + (\overline{b}.\mathrm{A}) \xrightarrow{\overline{b}} (\mathrm{A} \mid a.\mathrm{B})}$$

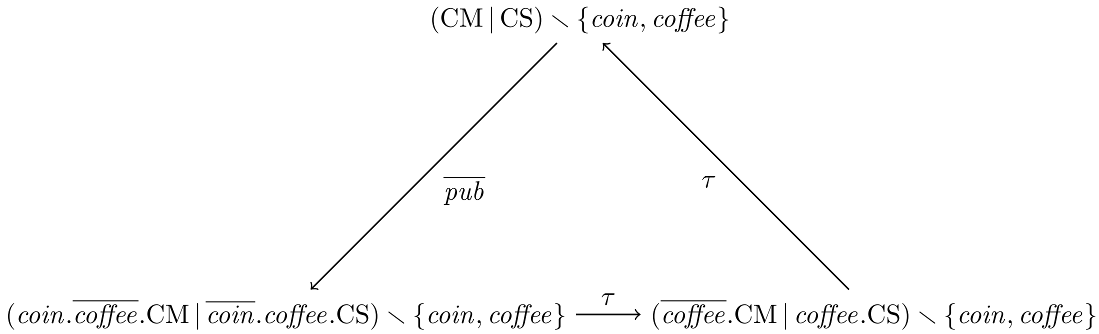
2 Labelled Transition Systems

Consider the following defining CCS equations:

$$\begin{aligned}
\mathrm{CM} &\overset{\mathsf{def}}{=} \mathit{coin}.\overline{\mathit{coffee}}.\mathrm{CM} \\
\mathrm{CS} &\overset{\mathsf{def}}{=} \overline{\mathit{pub}}.\overline{\mathit{coin}}.\mathit{coffee}.\mathrm{CS} \\
\mathrm{UNI} &\overset{\mathsf{def}}{=} (\mathrm{CM} \mid \mathrm{CS}) \smallsetminus \{\mathit{coin}, \mathit{coffee}\}
\end{aligned}$$

Use the rules of the SOS semantics for CCS to derive the labelled transitions system for the process UNI defined above. The proofs can be ommitted and a drawing of the LTS is enough.

2.1 Solution


$(\mathrm{CM} \mid \mathrm{CS}) \setminus \{coin, coffee\}$
$\overline{pub}$
τ
$(coin.\overline{coffee}.\mathrm{CM} \mid \overline{coin}.coffee.\mathrm{CS}) \setminus \{coin, coffee\}$
τ
$(\overline{coffee}.\mathrm{CM} \mid coffee.\mathrm{CS}) \setminus \{coin, coffee\}$