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# Modelling Concurrent Systems

## Homework 7

$$1. \quad a. (\bar{c}.0 + b.0) \mid ((c.0 + \bar{a}.0) \mid \bar{b}.0) \xrightarrow{\tau} Q \xrightarrow{\tau} R.$$

$a. (\bar{c}.0 + b.0) \xrightarrow{a} \bar{c}.0 + b.0 \quad \overline{a.P \rightarrow P}$	$\frac{\bar{a}.0 \xrightarrow{\bar{a}} 0 \quad \overline{a.P \rightarrow P}}{c.0 + \bar{a}.0 \xrightarrow{\bar{a}} 0} \quad \frac{a \rightarrow a'}{P+a \rightarrow a'}$
$a. (\bar{c}.0 + b.0) \mid ((c.0 + \bar{a}.0) \mid \bar{b}.0) \xrightarrow{\tau} (\bar{c}.0 + b.0) \mid (0 \mid \bar{b}.0)$	$\frac{c.0 + \bar{a}.0 \xrightarrow{\bar{a}} 0 \quad \overline{a.P \rightarrow P}}{(c.0 + \bar{a}.0) \mid \bar{b}.0 \xrightarrow{\bar{a}} 0 \mid \bar{b}.0} \quad \frac{P \rightarrow P'}{P+a \rightarrow P'}$
	$\frac{P \rightarrow P' \quad a \rightarrow a'}{P+a \xrightarrow{\tau} P'+a'} \quad \frac{P+a \xrightarrow{\tau} P'+a'}{P+a \xrightarrow{\tau} P'+a'}$

$\Rightarrow Q = (\bar{c}.0 + b.0) \mid (0 \mid \bar{b}.0)$

$b.0 \xrightarrow{b} 0 \quad \overline{a.P \rightarrow P} \quad \frac{a \rightarrow a'}{P+a \rightarrow a'}$	$\frac{\bar{b}.0 \xrightarrow{\bar{b}} 0 \quad \overline{a.P \rightarrow P}}{0 \mid \bar{b}.0 \xrightarrow{\bar{b}} 0 \mid 0} \quad \frac{a \rightarrow a'}{P+a \rightarrow P+a'}$
$(\bar{c}.0 + b.0) \mid (0 \mid \bar{b}.0) \xrightarrow{\tau} 0 \mid (0 \mid 0)$	$\frac{P \rightarrow P' \quad a \rightarrow a'}{P+a \xrightarrow{\tau} P'+a'} \quad \frac{P+a \xrightarrow{\tau} P'+a'}{P+a \xrightarrow{\tau} P'+a'}$

$\Rightarrow R = 0 \mid (0 \mid 0) = 0$