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2003
p7 q10
GW

Topics in Concurrency Qu 1

(1) Suppose states s_0, t_0 satisfy the same model of μ-calculus assertions.

Define

$$R = \{(s^{\#},t^{\#}) \mid s^{\#}, t^{\#} \text{ satisfy same assertions}\}$$

a relation between states of two (finite) trans. sys.

We show R is a ~~bis~~ strong bisimulation, which will then make s_0, t_0 bisimilar.

Suppose otherwise. Then, either

(i) $s \xrightarrow{a} s'$ and $\forall t'.\ t \xrightarrow{a} t'\ \&\ (s',t') \notin R$

or

(ii) $t \xrightarrow{a} t'$ and $\forall s'.\ s \xrightarrow{a} s'\ \&\ (s',t') \notin R$.

W.l.o.g. assume (i). Then, for all t' s.t. $t \xrightarrow{a} t'$ there is an assertion $A_{t'}$ s.t.

$s \models A_{t'}$ and $t' \not\models A_{t'}$. (If we first obtain $B_{t'}$ s.t. $s \not\models B_{t'}$ and $t' \models B_{t'}$, we take $A_{t'} = \neg B_{t'}$).

Now $s \models \langle a \rangle \bigwedge_{t' \atop t \xrightarrow{a} t'} A_{t'}$ and $t \not\models \langle a \rangle \bigwedge_{t'} A_{t'}$

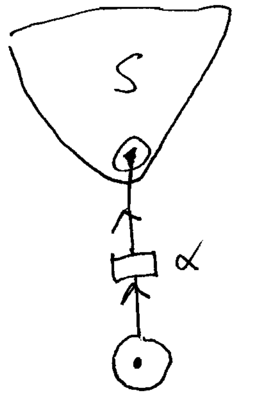
— a contradiction.

(2)

x

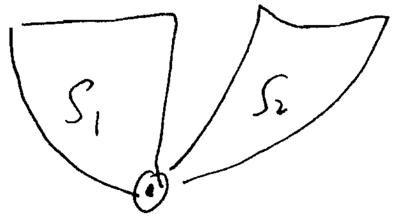
create a condition x and mark it.

$\alpha \cdot S$



prefix an α-event to the initial condition of S. (removing its token)

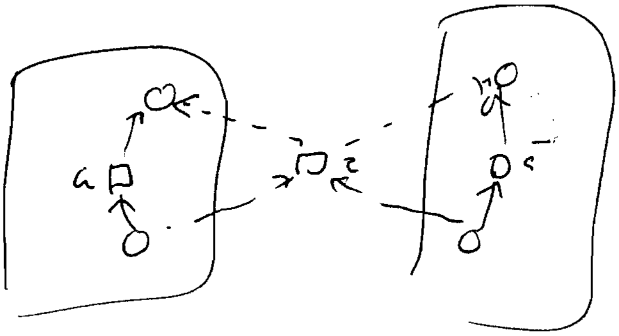
$S_1 + S_1$



identify the nets for S_1 and S_2 at their initial condition

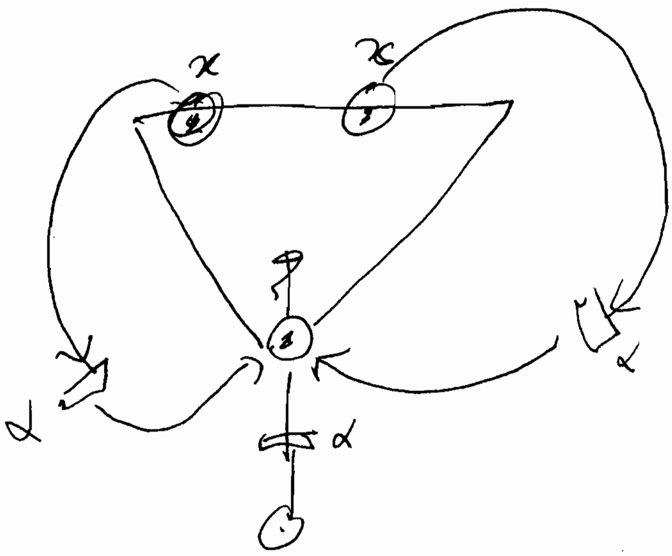
$t \setminus a$ remove all events with a or $\bar{a}$ as labels.

$t_1 \| t_2$



for each pair of complementary events one from t_1, one from t_2 introduce a τ-event with pre and postconditions those of the two events.

$rec\ x.\ \alpha s$



The nets are 'basic nets' with labels on events.

$M \xrightarrow{e} M'$ iff ${}^{\cdot}e \subseteq M$ & $e^{\cdot} \cap (M \setminus {}^{\cdot}e) = \phi$

& $M' = (M \setminus {}^{\cdot}e) \cup e^{\cdot}$

$\boxtimes$