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Example

Check the following equivalences

$$\bar{x} \mid y \quad \sim \quad \bar{x}.y \;+\; y.\bar{x}$$

$$a(x).(\ \bar{x} \mid y\ ) \quad \sim \quad a(x).(\ \bar{x}.y \;+\; y.\bar{x}\ )$$

Weak Bisimulation

Bascially as in the base calculus, allowing us to have silent steps before and after labeled steps, except for some subtleties ...

$$\bullet \Rightarrow \bullet \xrightarrow{y} \{^{\vec{z}}/_{\vec{x}}\}P \bullet \Rightarrow \bullet$$

$$\bullet \Rightarrow \bullet \xrightarrow{\bar{y}} (\boldsymbol{\nu}\vec{z})\,\langle\vec{x}\rangle.P \bullet \Rightarrow \bullet$$

Observations

Definition:

$$P \xrightarrow{x\langle\vec{y}\rangle} P' \text{ if,}$$

for some F, $P \xrightarrow{x} F$ and $F\langle\,\vec{y}\,\rangle \equiv P$

$$P \xRightarrow{x\langle\vec{y}\rangle} P' \text{ iff } P \Rightarrow \xrightarrow{x\langle\vec{y}\rangle} \Rightarrow P'$$

$$P \xRightarrow{\bar{x}} (\boldsymbol{\nu}\vec{z})\langle\vec{y}\rangle.P' \text{ if,}$$

for some P'', $P \Rightarrow \xrightarrow{x} (\boldsymbol{\nu}\vec{z})\langle\vec{y}\rangle.P''$ and $P'' \Rightarrow P'$.

Observation Equivalence

Definition:
A binary relation $\mathcal{S}$ is a weak simulation if,
whenever $P \mathrel{\mathcal{S}} Q$,
if $P \to P'$, then there is Q
s.t. $Q \Rightarrow Q'$ and $P' \mathrel{\mathcal{S}} Q'$,
if $P \xrightarrow{x\langle\vec{y}\rangle} P'$, then there is Q
s.t. $Q \xRightarrow{x\langle\vec{y}\rangle} Q'$ and $P' \mathrel{\mathcal{S}} Q'$,
if $P \xrightarrow{\bar{x}} C$, then there is Q
s.t. $Q \xRightarrow{\bar{x}} D$ and $C \mathrel{\mathcal{S}} D$,