8. Simulation und Äquivalenz

8.3 Weitere Kongruenzen
4. Further Congruences

K | U | B | RT | FT | F | CT | T

less ← identification → more

We consider them from right to left.
Complete Trace Equivalence

Combining termination and choice ...

\[ \begin{array}{c}
L \\
\text{a} \\
\text{b}
\end{array} \quad \begin{array}{c}
R \\
\text{a} \\
\text{b}
\end{array} \]

\( a \) is a complete trace of \( L \) but not of \( R \)
Failure Equivalence of a set M of actions

**Def.** For an action w and a set of actions M:

\([w,M]\) is a *failure pair* of P iff P may do a step

\[P \xrightarrow{-w} Q\]

and no action of M is enabled in Q.

\[\begin{array}{c}
L \\
a \\
b \\
c
\end{array}\]

\[\begin{array}{c}
R \\
a \\
b \\
c
\end{array}\]

\[\begin{array}{c}
\equiv_T \\
\equiv_{CT} \\
\neq_F
\end{array}\]

\([a,\{c\}]\) is a failure pair of L but not of R.
Failure Trace Equivalence

... like Failure equivalence.

But now you continue along a trace

\[
\begin{align*}
L & : a \xrightarrow{f} c \xrightarrow{e} d \\
R & : a \xrightarrow{f} b \xrightarrow{c} c \xrightarrow{e} d
\end{align*}
\]

\[
\begin{align*}
\Rightarrow & \neq_{FT} \\
\Rightarrow & F \\
\end{align*}
\]

\[
a \{f\} c \{e\} d \text{ is a failure trace of } L \text{ but not of } R
\]
Ready Trace Equivalence

In a trace, between each two actions, present the alternative actions.

\[ [a,\{c\},b] \text{ is a ready trace of } L \text{ but not of } R \]
Tree Equivalence

Unfold the transition systems as trees

$L \equiv_U R$ iff both trees are isomorphic

L

\[
\begin{array}{c}
\text{a} \\
\end{array}
\]

R

\[
\begin{array}{c}
\text{a} \\
\end{array}
\]

Bisimulation equivalence

K | U | B | RT | FT | F | CT | T
Structural Equivalence

Equivalence:

$L =_K R$ iff the transition systems are isomorphic

\[ a \xrightarrow{\text{K}} a \]
Further equivalences

Ready equivalence
Ready Simulation equivalence
Ready Trace Simulation equivalence
Completed Simulation equivalence
Failure Simulation equivalence
Failure Trace Simulation equivalence
Simulation equivalence
...

152 ones
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Ende