Model Checking WS 2011: Assignment 8

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Exercise 29

Let $A$, $B$ and $C$ be LTS defined as follows:

- $A := (\{1,2,3,4\}, \{1\}, \{a,t,s\}, \{(1,a,2),(2,t,3),(3,a,4),(4,s,4)\})$.
- $B := (\{1,2,3\}, \{1\}, \{b,t,s\}, \{(1,b,2),(2,t,2),(2,b,3),(3,s,1)\})$.
- $C := (\{1,2,3\}, \{1\}, \{a,b,t,s\}, \{(1,a,1),(1,b,1),(1,t,2),(2,a,2),(2,b,2),(2,s,3)\})$.

Given LTS $A$, $B$ and $C$ as defined above, $(A \parallel B) \times C$ describes a model checking problem where $C$ is the “checker automaton”.

Draw the state graph $G$ for $(A \parallel B) \times C$ without applying partial order reduction but – as usual – with on-the-fly generation of reachable states.

Exercise 30

Given the state graph $G$ for $(A \parallel B) \times C$ from Exercise 29.

1. Find all traces of maximum length in $G$.
2. Which of the traces of a) are locally-equivalent? How many equivalence classes are there?
3. Find all states and transitions in $G$ which would be generated on-the-fly if partial order reduction was applied during the construction of the state graph for $(A \parallel B) \times C$. Choose $A$ whenever there is a choice between locally expanding a state with respect to $A$ or $B$. Annotate states in $G$ if they are local to $A$ or $B$ or not.
Exercise 31

For the model checking problem given above, perform reachability analysis with on-the-fly generation of states and partial order reduction and draw the resulting LTS. If there are multiple choices for local expansion, then choose the rightmost among all components in the asynchronous composition which are ready for local expansion.

Exercise 32

For the model checking problem given above, perform reachability analysis with on-the-fly generation of states and partial order reduction and draw the resulting LTS. If there are multiple choices for local expansion, then choose the rightmost among all components in the asynchronous composition which are ready for local expansion.