Model Checking WS 2011: Assignment 8

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Due 15.12.2011

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, $(A \mid\mid B) \times C$ describes a model checking problem where C is the "checker automaton".

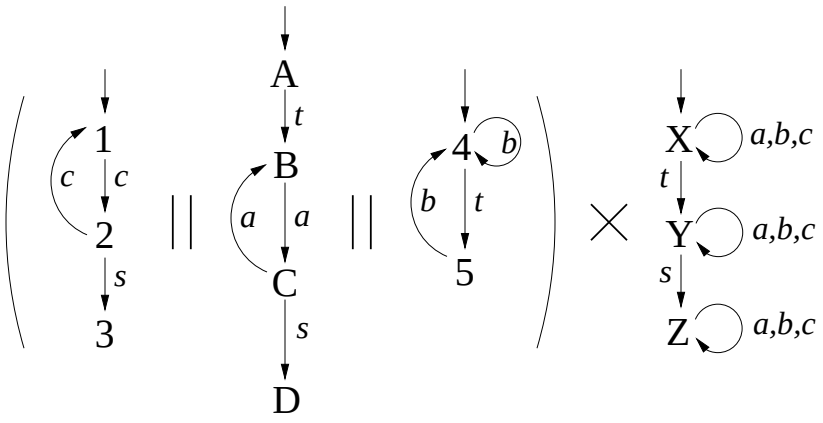
Draw the state graph G for $(A \mid\mid B) \times C$ *without* applying partial order reduction but – as usual – *with* on-the-fly generation of reachable states.

Exercise 30

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

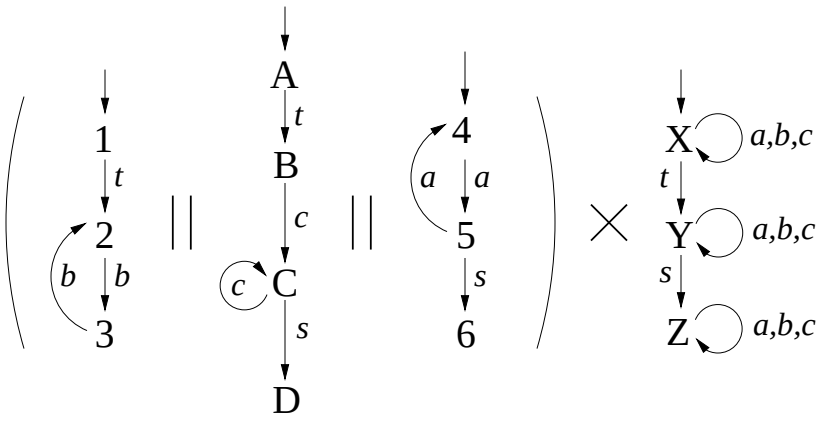
1. Find all traces of *maximum* length in G.
2. Which of the traces of a) are locally-equivalent? How many equivalence classes are there?
3. Find all states and transitions in G which would be generated on-the-fly if partial order reduction was applied during the construction of the state graph for $(A \mid\mid B) \times C$. 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.