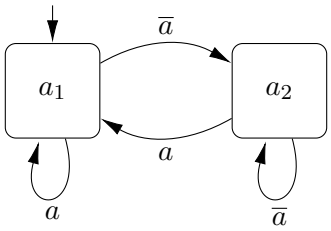
Technische Universität München
Institut für Informatik I07
Theoretical Computer Science

Quantitative Verification 10 - Solutions

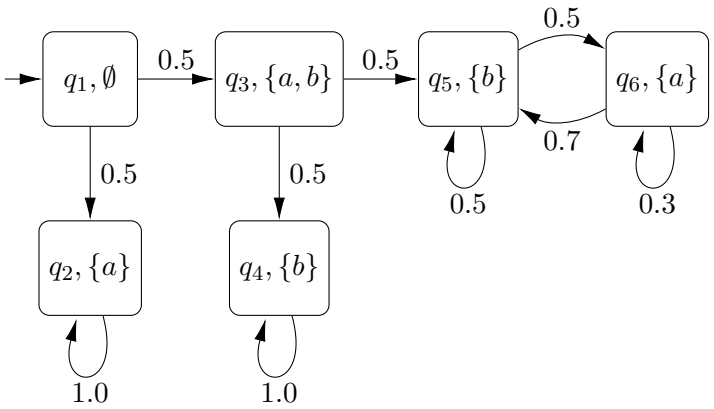
Ex 1: PLTL Model Checking

First, we derive the Rabin Automaton for the given LTL formula:

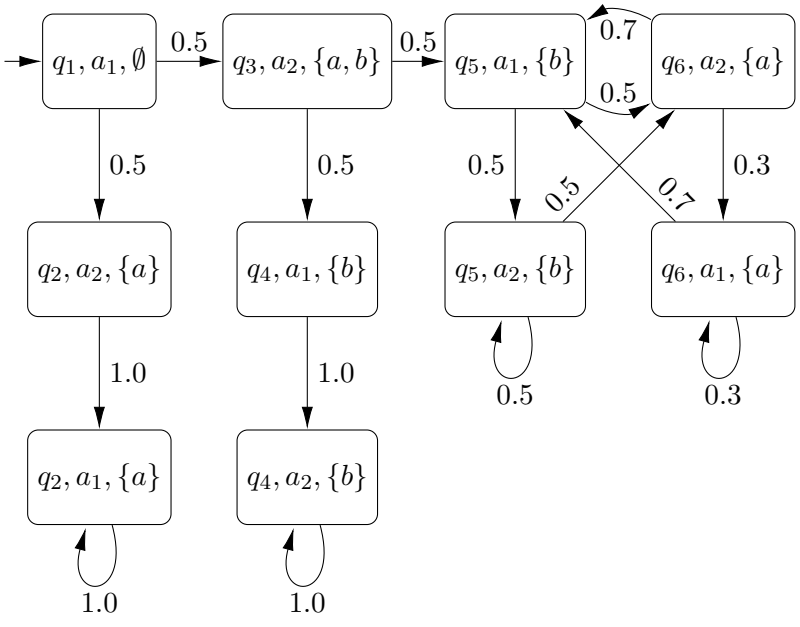


Acceptance: $\{(\{a_1\}, \{a_2\}), (\{a_2\}, \{a_1\})\}$.

We name all states in the chain for readability:

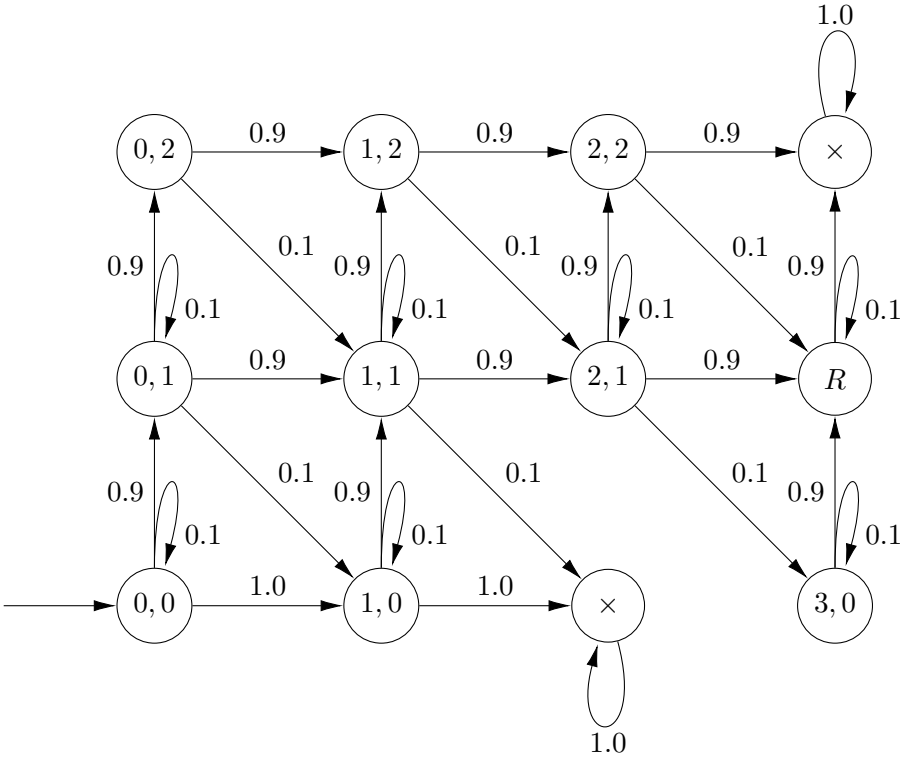


Now, we construct the Markov Chain-Automaton product, keeping the labels for readability.



In this product system, we search for all BSCCs and analyse them for acceptance. Only the $\{(q_2, a_1)\}$ and $\{(q_4, a_2)\}$ BSCCs are accepting, and this state set is reached with probability 0.75.

Ex 2: MDP Modelling



Ex 3: MDP Reachability

- s_2: Prob = 1 with $\{s_0 \mapsto a, s_1 \mapsto a\}$.
- s_5: $\{s_0 \mapsto a, s_1 \mapsto b, s_3 \mapsto b, s_4 \mapsto b\}$. There are uncountably many different strategies, since we can randomize in, e.g., s_4.