Concurrency Theory (WS 2011/12) Out: Tue, Dec 20 Due: Mon, Jan 9

Exercise Sheet 10

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Problem 1: Control Loop Acceleration

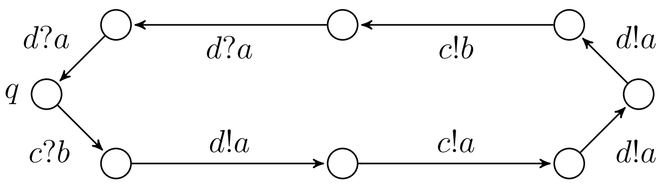
Let $\preceq^*_{cyc}$ and $\preceq^*_{grow}$ the word orderings given in class for proving Theorem 7.3. Determine n and $p \oplus ops^{\geq n}$ when $p = (a+b)^*(c+\epsilon)b^*$ and ops is each of:

$$?a\,!b\,?c$$
$$!a\,!b\,?c\,?a$$
$$!a\,?c\,!b\,?a\,!c$$
$$?c\,!c\,!a\,?a\,!b\,!c\,!a$$

Specify and argument in which of the four cases discussed in class each sequence falls.

Problem 2: Control Loop Acceleration

Consider the following control loop in a lossy channel system:



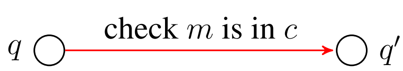
Set up the sequences of channel operations ops_c and ops_d and determine

$$\left(q, \begin{pmatrix} ((b+\varepsilon).(a+b)^*) \oplus ops_c^* \\ b^* \oplus ops_d^* \end{pmatrix}\right).$$

State and justify the case (1)-(4) that applies for the acceleration of ops_c and ops_d, respectively. Give numbers n after which the effect of ops_c and ops_d stabilises.

Problem 3: Conditional Construction

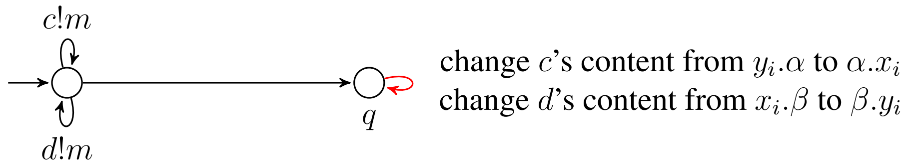
Give a construction that implements (by several lcs transitions) the "transition" outlined below.



The construction should deadlock if $m \notin W(c)$ in state q. Otherwise, it should change state and leave the channel content in q' identical to the one in q up to lossines.

Problem 1: Rotation Construction

Remember the lcs sketched in class for proving RSP's undecidability:



Provide a formal description/implementation of the red ”transition”.