Concurrency Theory

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Sheet 7

Due: Monday, 2025-12-15

Exercise 7.1

Give a (recursive) HML formula for each of the following informal process properties.

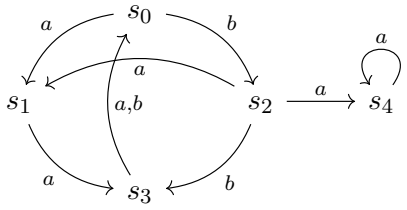
a) Each computation path eventually reaches an a.

b) Each computation path consisting of only a's and b's, ends in an infinite computation path of a's.

c) Among states visited by a computation path of b's, there are only finitely many where an a is possible.

Exercise 7.2

Consider the LTS:



Compute the fixed-point iteration for the following equation system as described in the lecture:

$$\begin{pmatrix} X_1 \overset{\min}{=} [a]X_1 \vee \langle b\rangle X_2 \\ X_2 \overset{\max}{=} [b]X_2 \wedge \langle b\rangle X_2 \end{pmatrix}.$$

Exercise 7.3

Consider the following process definition:

$$\begin{aligned} B_0 &= in.B_1 \\ B_1 &= \overline{out}.B_0 + in.B_2 \\ B_2 &= \overline{out}.B_1 \end{aligned}$$

Compute a (recursive) HML formula X such that $P \models X$ is true iff $B_0 \sim P$ for all processes $P \in \mathit{Proc}$.

If you have questions, please post a message in the dedicated chat.

Exercise 7.4

Define a value passing process `Counter` that outputs the sequence of natural numbers, i.e. $\overline{\text{out}}(0), \overline{\text{out}}(1), \overline{\text{out}}(2), \overline{\text{out}}(3), \ldots$, but where arbitrarily many τ's may occur between the outputs.