

Concurrency Theory

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University of Freiburg
Winter 2025

Sheet 7
Due: Monday, 2025-12-15

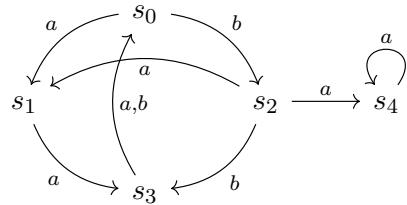
Exercise 7.1

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

- Each computation path eventually reaches an a .
- Each computation path consisting of only a and b ends in an infinit computation path of a 's.
- 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:

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

Exercise 7.3

Consider the following process definition:

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

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

If you have questions, please post a message in the dedicated [chat](#).

Exercise 7.4

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

Counter = ...

Adder = ...

Adder' = ...

Buffer = ...