Concurrency Theory

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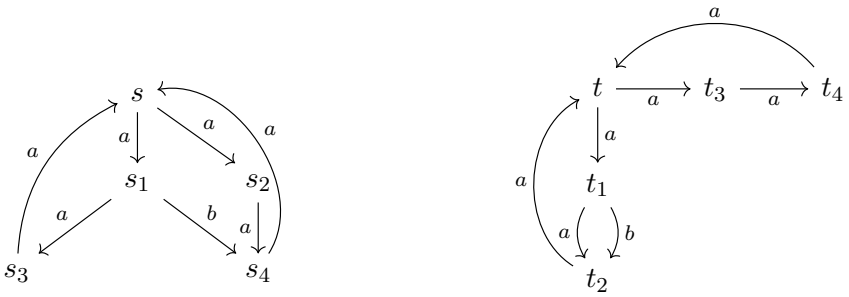
Sheet 2

Due: Monday, 2025-11-10

Exercise 2.1 (Bisimulation from LTS)
Consider the two LTS below.



Show that $s \sim t$ by constructing a strong bisimulation.

Exercise 2.2 (Bisimulation from CSS)
Consider the two CSS processes below.

$$P \doteq a.P_1$$
$$P_1 \doteq b.P + c.P$$

$$Q \doteq a.Q_1$$
$$Q_1 \doteq b.Q_2 + c.Q$$
$$Q_2 \doteq a.Q_3$$
$$Q_3 \doteq b.Q + c.Q_2$$

Show that $P \sim Q$ by constructing a strong bisimulation.

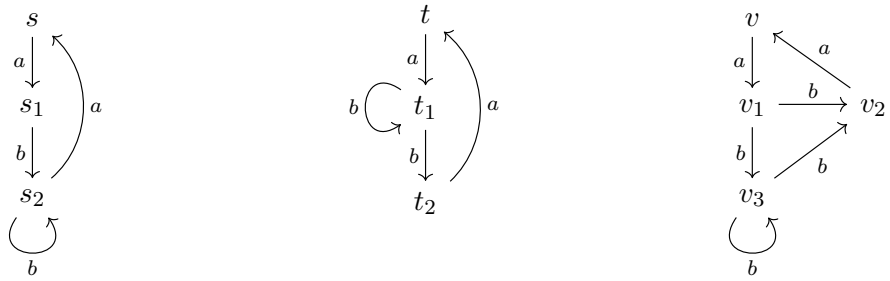
Exercise 2.3 (LTS Isomorphism implies Bisimulation)
Prove that two processes with isomorphic LTS are also strongly bisimilar.

Exercise 2.4 (Bisimulation Laws)
Prove the two bisimulation laws below.

- $P|\text{Nil} \sim P$
- $P|Q \sim Q|P$

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

Exercise 2.5 (Game Characteristics)
Consider the three LTS below.



Show that $s \not\sim t$ and $s \not\sim v$ by stating a universal winning strategy for the attacker.