

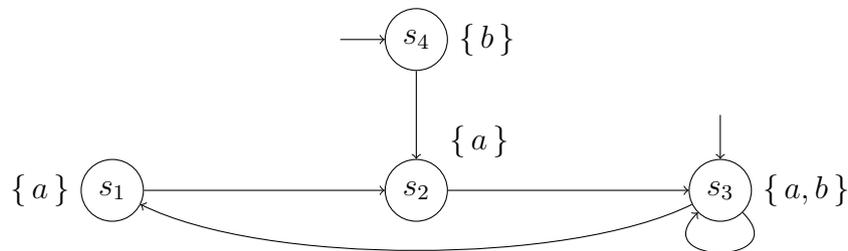


Tutorials for Cyber-Physical Systems I - Model Checking

Exercise sheet 9

Exercise 1: LTL

Consider the following transition system over the set of atomic propositions $\{a, b\}$:



Indicate for each of the following LTL-formulae the set of states for which the formula is fulfilled:

- | | |
|------------------------------------|--------------------------|
| (a) $\bigcirc a$ | (d) $\square \diamond a$ |
| (b) $\bigcirc \bigcirc \bigcirc a$ | (e) $\square(b \cup a)$ |
| (c) $\square b$ | (f) $\diamond(a \cup b)$ |

Exercise 2: Stating Properties in LTL

Consider a lift system that services N floors numbered 0 through $N - 1$. Assume $door(i)$ indicates that the doors on the i -th floor are open, $lift(i)$ indicates that the lift is at floor i , and $req(i)$ indicates that the request button at floor i was pressed and is lit. In the lift cabin there are N buttons for the floors and $send(i)$ indicates that the i -th send button is lit.

State the following properties in LTL.

- A floor door is never open if the cabin is not present at that floor.
- A requested floor will be served sometime.
- The lift returns to floor 0 infinitely often.
- The lift does not move unless there is some request.