Model Checking (SS 2023) Homework 6
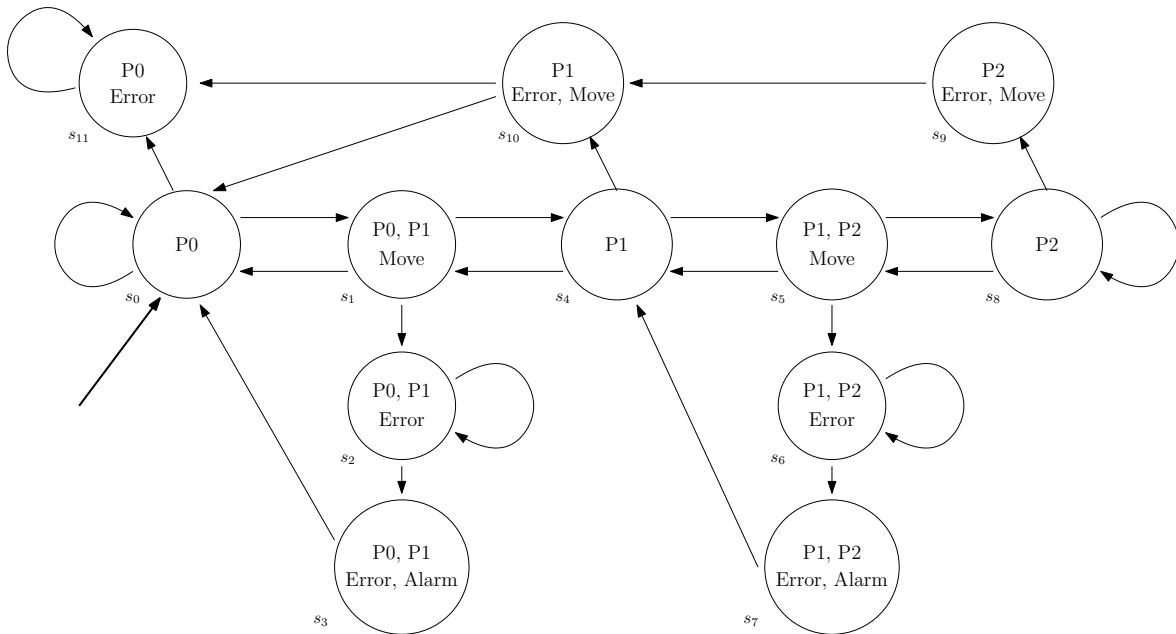
Deadline: **May 11, 2023, 4:00 pm**
Send your solution to `modelchecking@iaik.tugraz.at`
Homework can be done in groups of 1 or 2 students.
The groups need not be the same for each homework.

Consider the following Kripke structure M that models an elevator of a two-story building, with atomic propositions $AP = \{\text{P0, P1, P2, Move, Error, Alarm}\}$ and states $S = \{s_0, \ldots, s_{11}\}$.

Task 1. [2 points] Use the algorithm for explicit state model checking of CTL discussed in the lecture to decide whether K satisfies the CTL formula $f = EG(\neg EX \neg \text{Error})$.

Task 2. [4 points] Use the algorithm for explicit state model checking of CTL discussed in the lecture to decide whether K satisfies the CTL formula $g = AG(\text{Alarm} \rightarrow AX(\neg \text{Error} \vee \text{P2}))$.

Task 3. [4 points] Use the algorithm for explicit state model checking of CTL discussed in the lecture to decide whether K satisfies the CTL formula $h = EG\big((P1 \wedge \neg P0) \rightarrow (EX\ AX \text{Move})\big)$.

To show the execution of the algorithm, indicate, for each subformula, the set of states that satisfy it. You can either write them down, on illustrate them clearly in the Kripke structure.

In case you opt for marking the satisfied subformulas graphically, in the next page there is the same Kripke structure clean from any labels.