

Week-1: Introduction to model checking

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NPTEL-course

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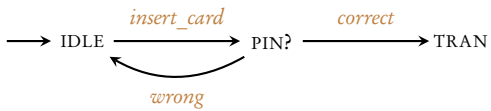
Module 1:
Modeling code behaviour

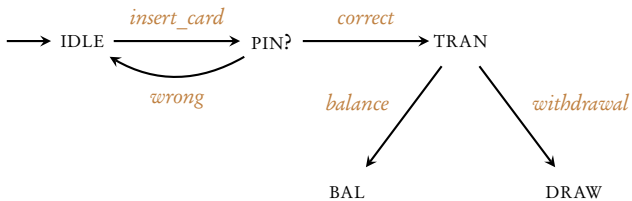


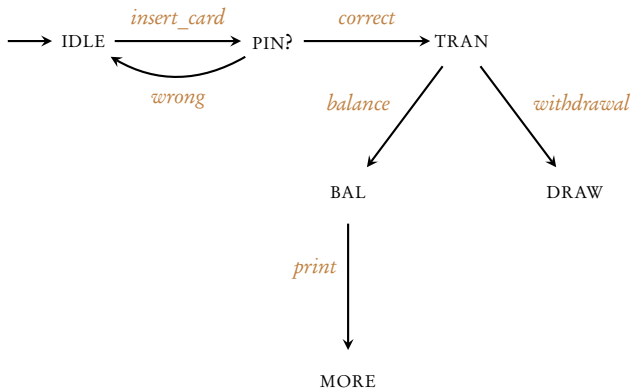


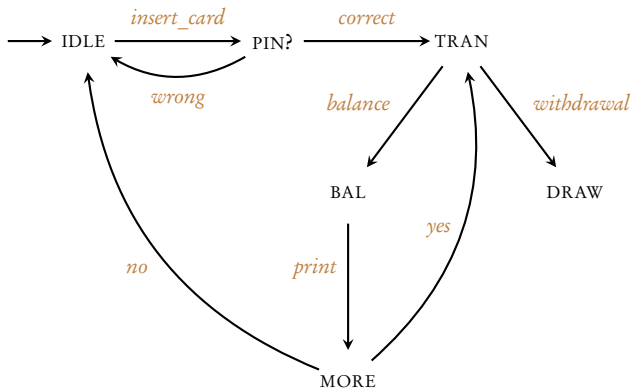
→ IDLE

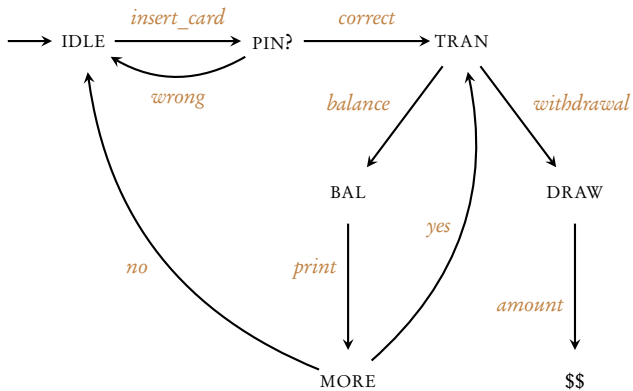


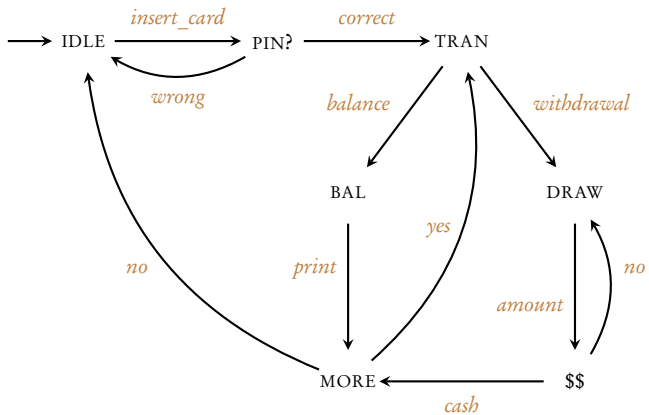


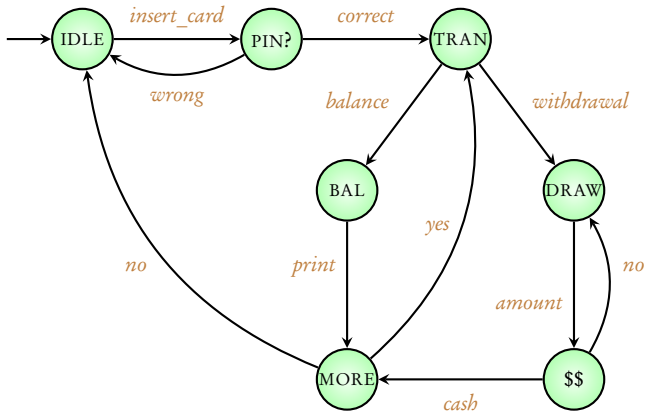


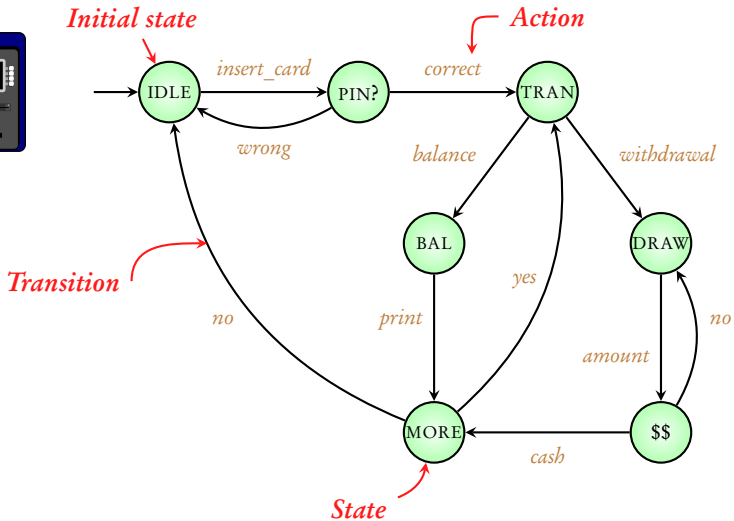




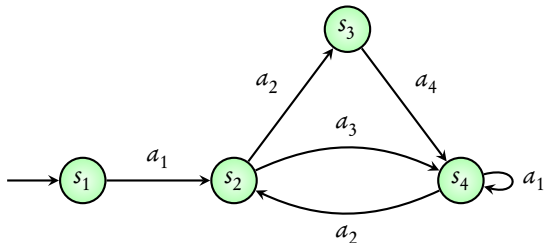








Transition system



States

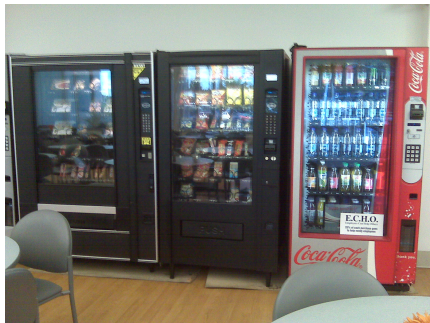
Actions

Transitions

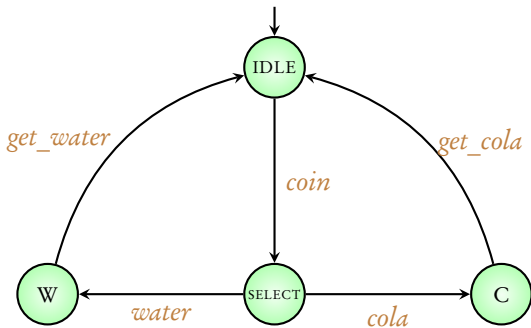
Initial state

Other names: Finite-state machines, State-transition graphs

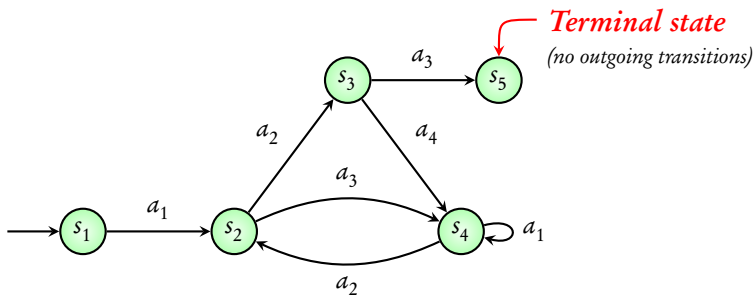
Coming next: Modeling a vending machine

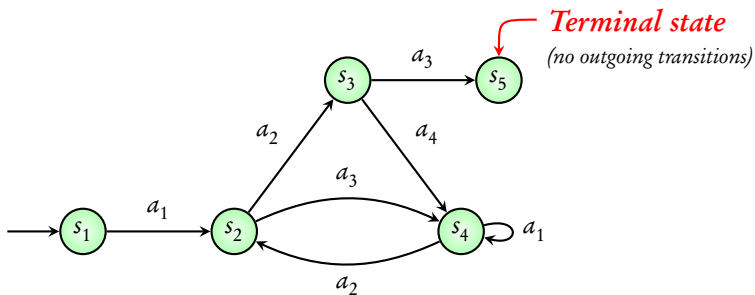


"Vending machines at hospital" by PCHS-NJROTC - Own work
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Coming next: some **terminology**



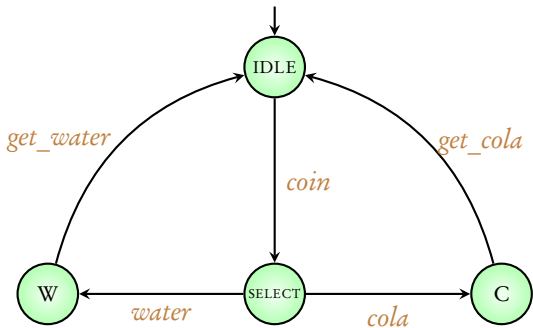


Execution:

$$s_1 \xrightarrow{a_1} s_2 \xrightarrow{a_3} s_4 \xrightarrow{a_2} s_2 \xrightarrow{a_3} s_4 \xrightarrow{a_2} s_2 \xrightarrow{a_3} s_4 \dots$$

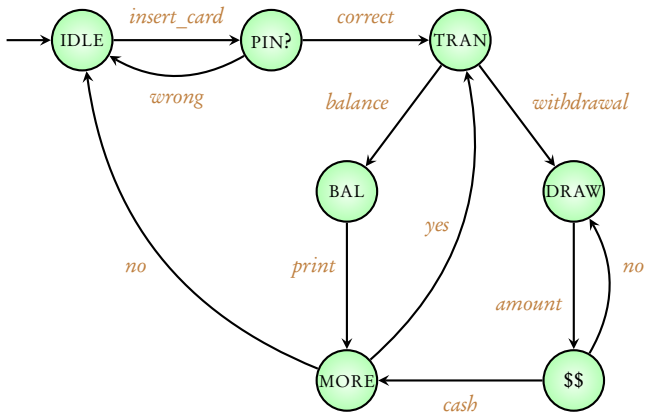
$$s_1 \xrightarrow{a_1} s_2 \xrightarrow{a_2} s_3 \xrightarrow{a_4} s_4 \xrightarrow{a_1} s_4 \xrightarrow{a_1} s_4 \xrightarrow{a_1} s_4 \dots$$

$$s_1 \xrightarrow{a_1} s_2 \xrightarrow{a_2} s_3 \xrightarrow{a_4} s_4 \xrightarrow{a_2} s_2 \xrightarrow{a_2} s_3 \xrightarrow{a_3} s_5$$



Execution:

IDLE $\xrightarrow{\text{coin}}$ SELECT $\xrightarrow{\text{water}}$ W $\xrightarrow{\text{get_water}}$ IDLE $\xrightarrow{\text{coin}}$ SELECT $\xrightarrow{\text{cola}}$...



Execution: IDLE $\xrightarrow{\text{insert_card}}$ PIN $\xrightarrow{\text{wrong}}$ IDLE $\xrightarrow{\text{insert_card}}$ PIN ...

Summary

Transition Systems

States, actions, transitions

Executions

Reference: Principles of Model Checking, *Baier and Katoen*, MIT Press (2008)

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