Introduction to Embedded Systems

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Exercise 2 MOC-stateChart

Statechart

1. Advantages of StateCharts

   What are the most important extensions of the StateChart model in comparison to an ordinary Finite state machine (FSM)?

2. Disadvantages of StateCharts

   What are the disadvantages of the StateChart formalism?

3. Tree of states for StateChart

   Given the StateChart in Figure 1. Draw the state space of the StateChart as a tree, which shows the hierarchy of states and denotes the state types (basic state, sequential states, and parallel states).
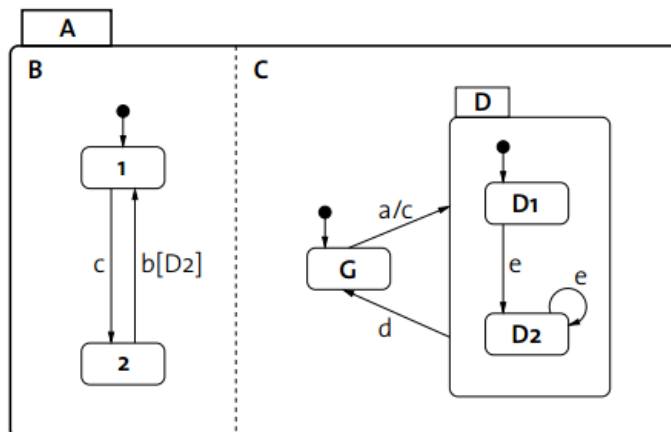

   Figure 1: StateChart

4. Formal computation of state space

   How would you formally compute the set of states? Compute the set of states for the hierarchical automata which is defined by the StateChart from Fig.1

5. Analysis

   The automaton defined by the StateChart from Fig. 1 passes through a number of states, when external events are applied. Show the sequence of state that are passed through, starting from the initial state, for the following sequence of events:

a,b,e,b,d,b. Use a table notation.

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6. Conversion of StateChart to a finite state machine (FSM)

   Draw a finite state machine which is equivalent to the StateChart from Fig. 1. Minimize the number of states.

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7. StateChart model of a vending machine

   The StateChart model of a simplified vending machine is shown in Figure 2.

   ○ Describe the trace of transitions occurring when the user inserts a coin and orders a tea.
   ○ The control of the vending machine has a bug that allows the user to cheat. Describe the trace of transitions that illustrate the bug.
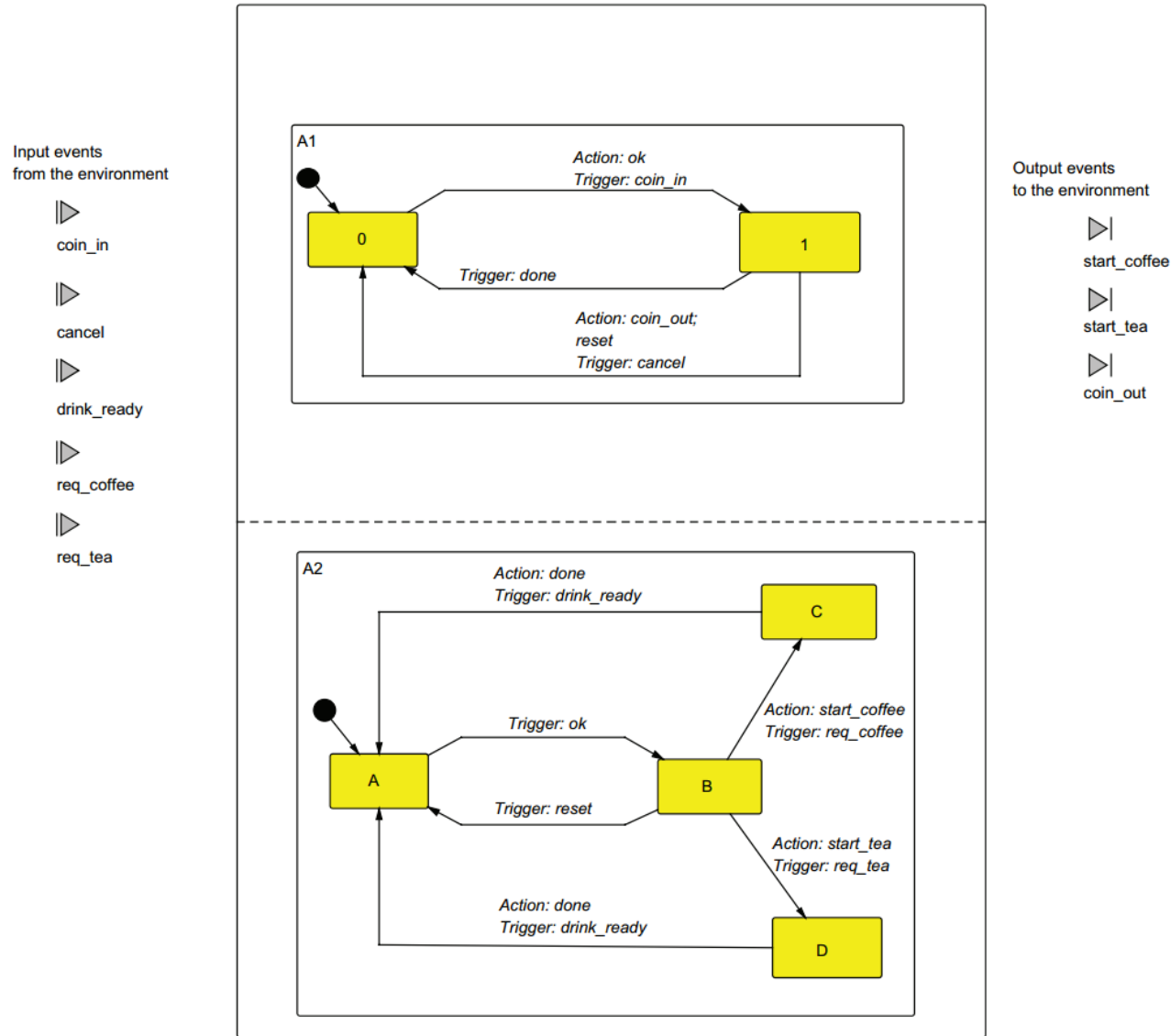   ○ Draw the corresponding StateChart that fixes the bug.

Figure 2: Vending Machine