Software Modeling and Verification
Lehrstuhl für Informatik 2
RWTH Aachen University

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Foundations of the UML

Winter Term 07/08

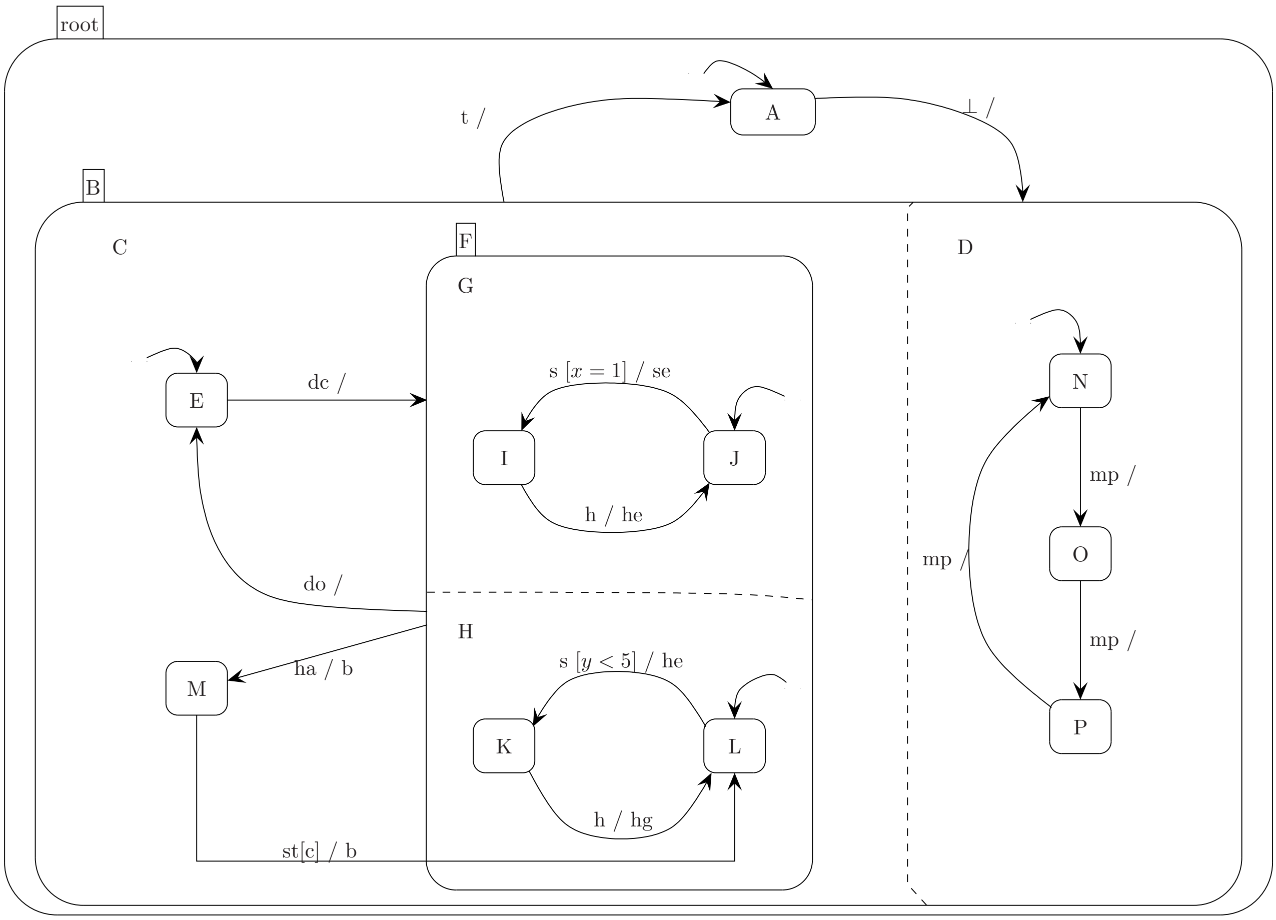
– Assignment 6 –

Hand in until January 23th before the exercise class.

Note: In this assignment an edge label of the form e/e' of Statechart Sc means that Sc is consuming event e and executing an action that is sending the event e' to Sc (i.e., to itself).

Exercise 1 **(10 points)**

Let the following Statechart $Sc = (N, E, Edges)$ be given:



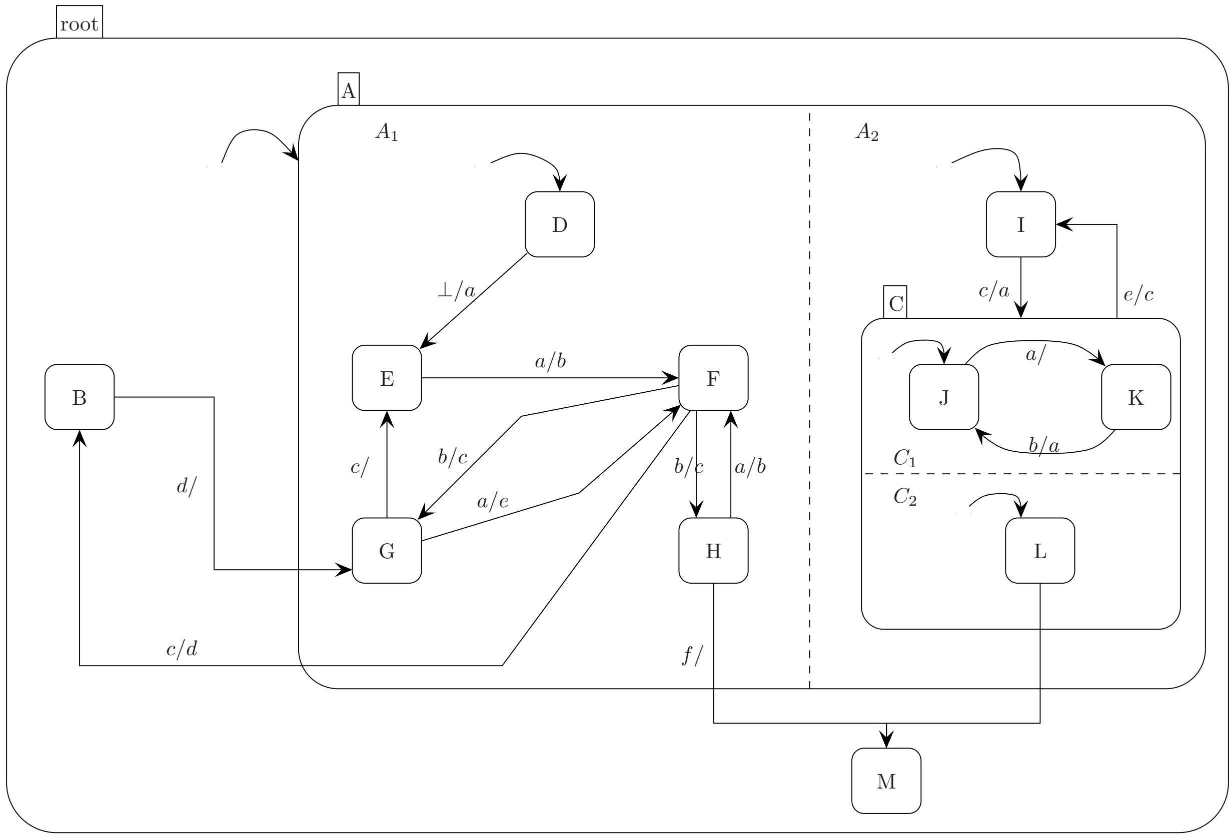
a) Describe Statechart Sc formally, i.e., give the components $(N, E, Edges)$.

b) Construct the tree that represents the node hierarchy of Statechart Sc.

c) Determine the types of the nodes of Statechart Sc.

Exercise 2 **(15 points)**

Let the following stand-alone Statechart (i.e., there are no Statecharts running in parallel to Sc) $Sc = (N, E, Edges)$ be given:



a) Determine 5 configurations (c_i, $i \in \{1, \dots, 5\}$) of Sc.

b) For each configuration from a) give two distinct example states (s_i, s'_i, $i \in \{1, \dots, 5\}$).

c) Calculate the sets of enabled edges $En(s)$ of all states s determined in b).

d) Determine the scopes of the edges:

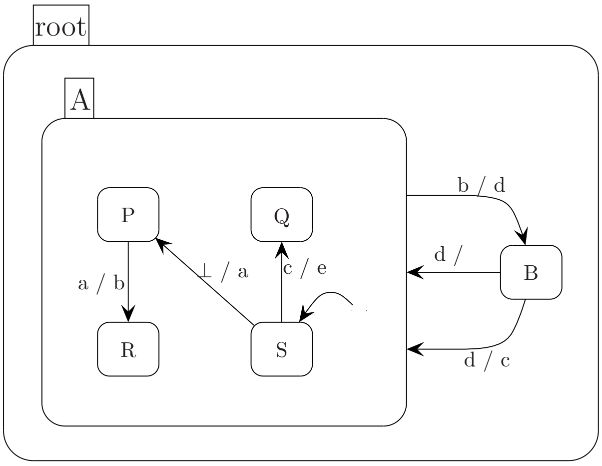
   (a) $\{\text{H,L}\} \longrightarrow \{\text{M}\}$
   (b) $\{\text{B}\} \longrightarrow \{\text{G}\}$
   (c) $\{\text{C}\} \longrightarrow \{\text{I}\}$

e) List at least 2 examples of pairs of inconsistent edges and 2 examples of pairs of consistent (and distinct) edges.

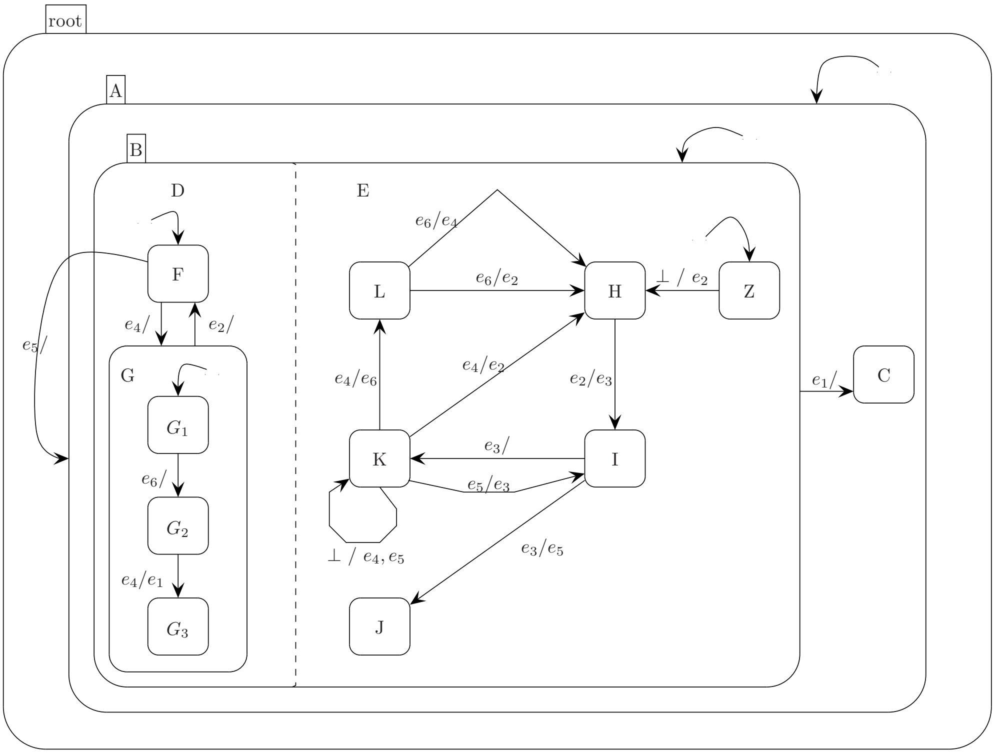
Exercise 3 **(15 points)**

Let the following Statecharts Sc_1 and Sc_2 be given:

Sc_1:



Sc_2:



a) Determine the formal semantics for each of the Statecharts Sc_1 and Sc_2 (i.e., construct the related Mealy machine for each Statechart) by successively calculating locations and steps (starting from the initial location l_0). In both cases write down all your calculations before constructing the corresponding automaton.

b) Determine the priority between moving from F to G and moving from F to A if both edges are enabled.