Software Modeling and Verification
Lehrstuhl für Informatik 2
RWTH Aachen University

Prof. Dr. Ir. J.-P. Katoen
Falak Sher
Sabrina von Styp

Theoretical Foundations of UML

Winter Term 12/13

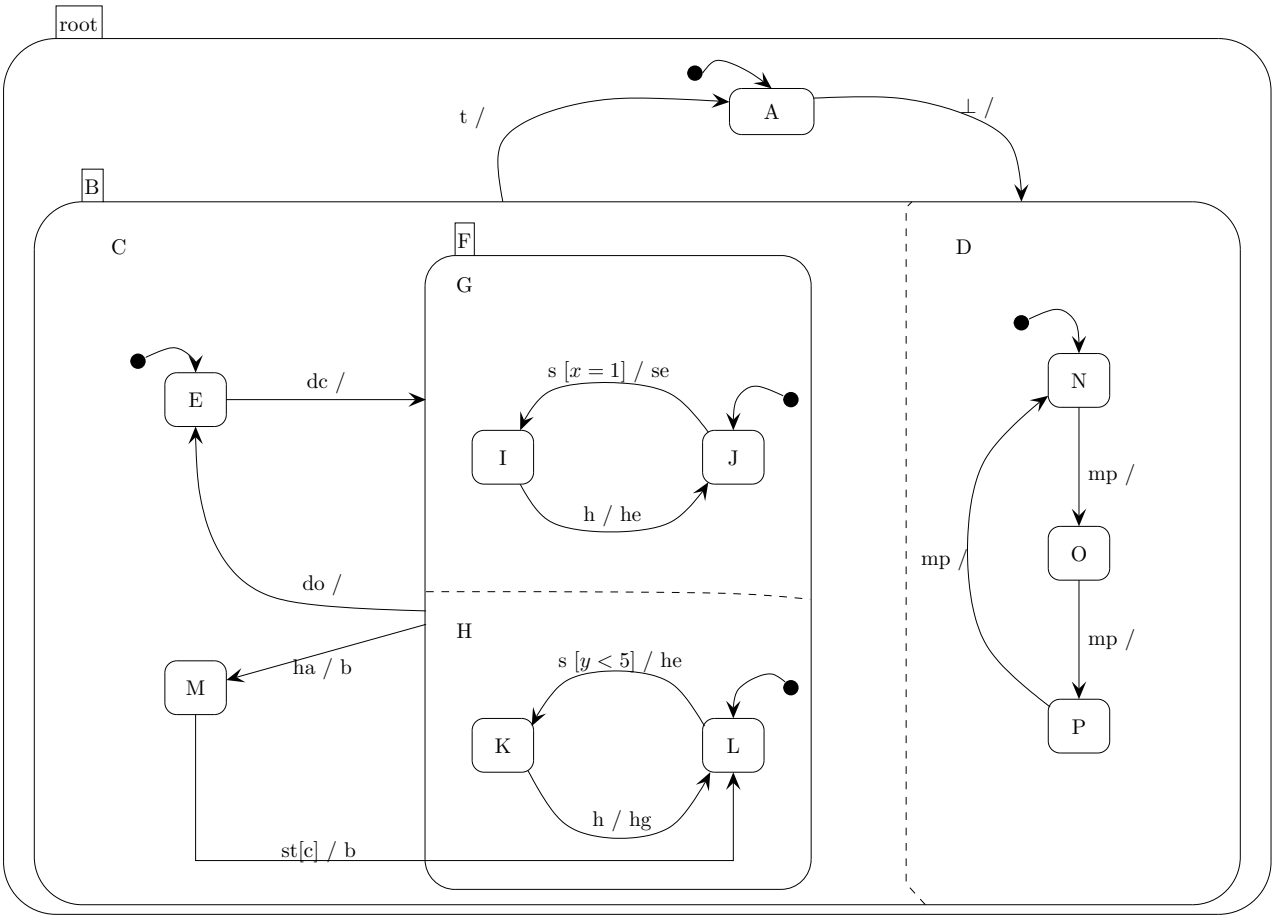
– Assignment 9 –

Hand in until January 30th 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:



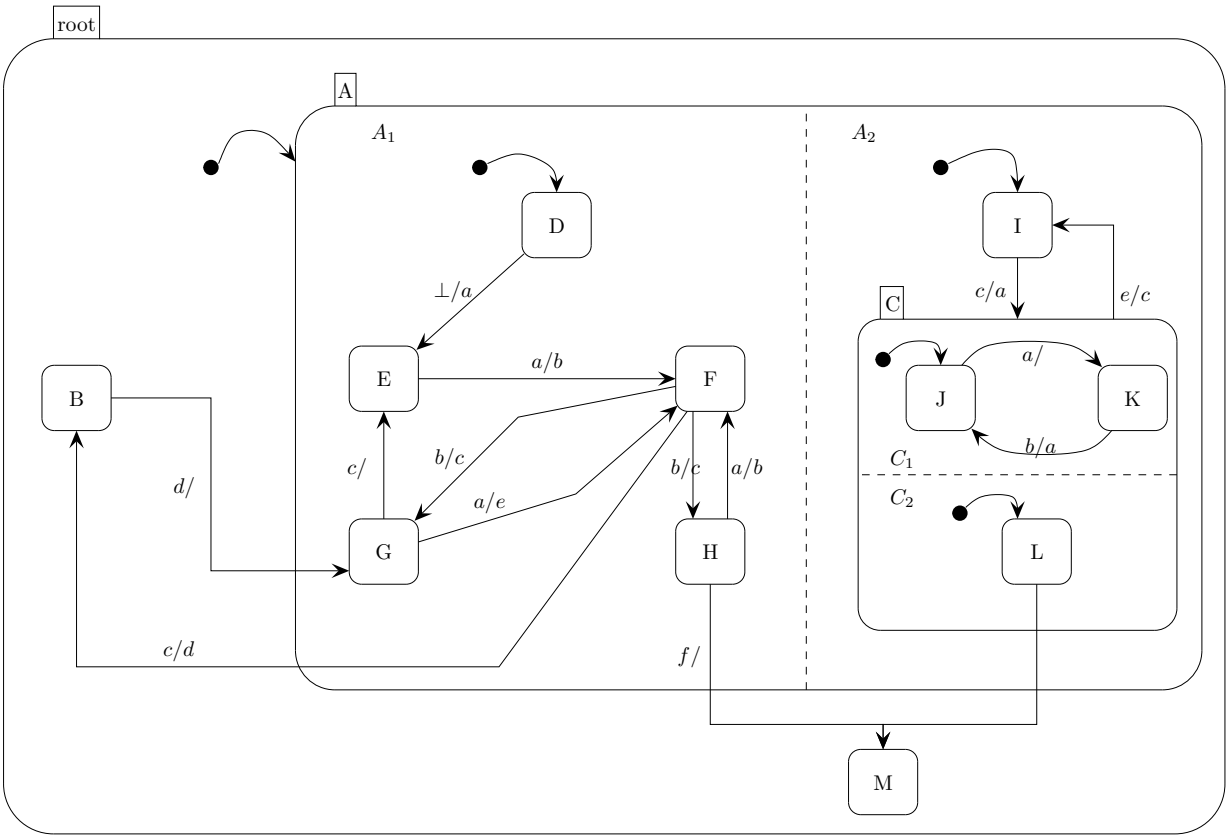
a) Describe Statechart Sc formally, i.e., give the components $(N, E, Edges)$.

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, $i \in \{1, \ldots, 5\}$) of Sc.

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

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

d) Determine the scopes of the edges:

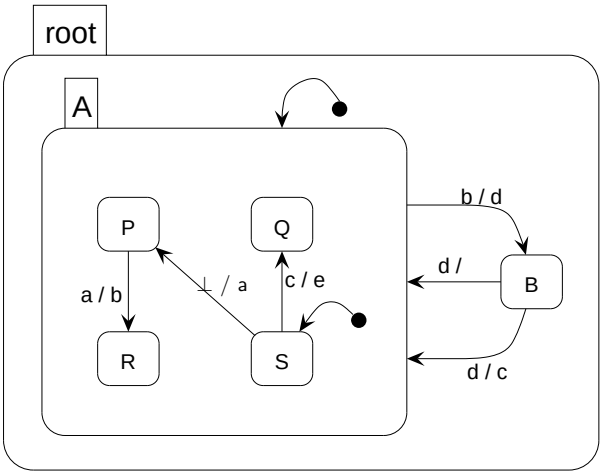
   (a) {H,L} $\longrightarrow$ {M}
   (b) {B} $\longrightarrow$ {G}
   (c) {C} $\longrightarrow$ {I}

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 Statechart Sc_1 be given:

Sc_1:



Determine the formal semantics for the Statechart Sc_1 (i.e., construct the related Mealy machine for the Statechart) by successively calculating locations and steps (starting from the initial location l_0). Write down all your calculations before constructing the corresponding automaton.