



Theoretical Foundations of the UML SS 2016

— Series 8 —

Hand in until 30th June before the exercise class

Exercise 1 (Communication-closed MSG) (3 Points)

Show that: every communication-closed MSG \mathcal{G} is regular.

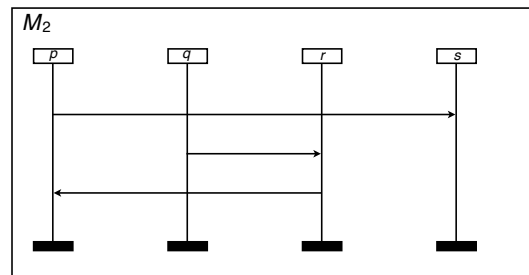
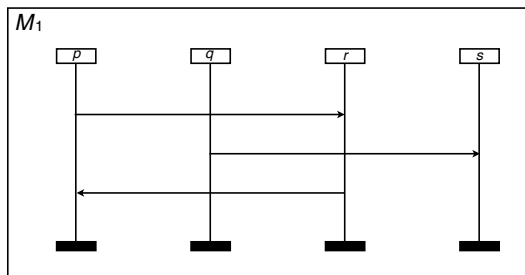
Exercise 2 (Finitely generated MSCs) (2 Points)

Prove the following remarks in the lecture.

- Each set of MSCs defined by an MSG G is finitely generated.
- Not every regular well-formed language is finitely generated.

Exercise 3 (Realising MSGs) (2+3 Points)

I. Given M_1 and M_2 as follows:

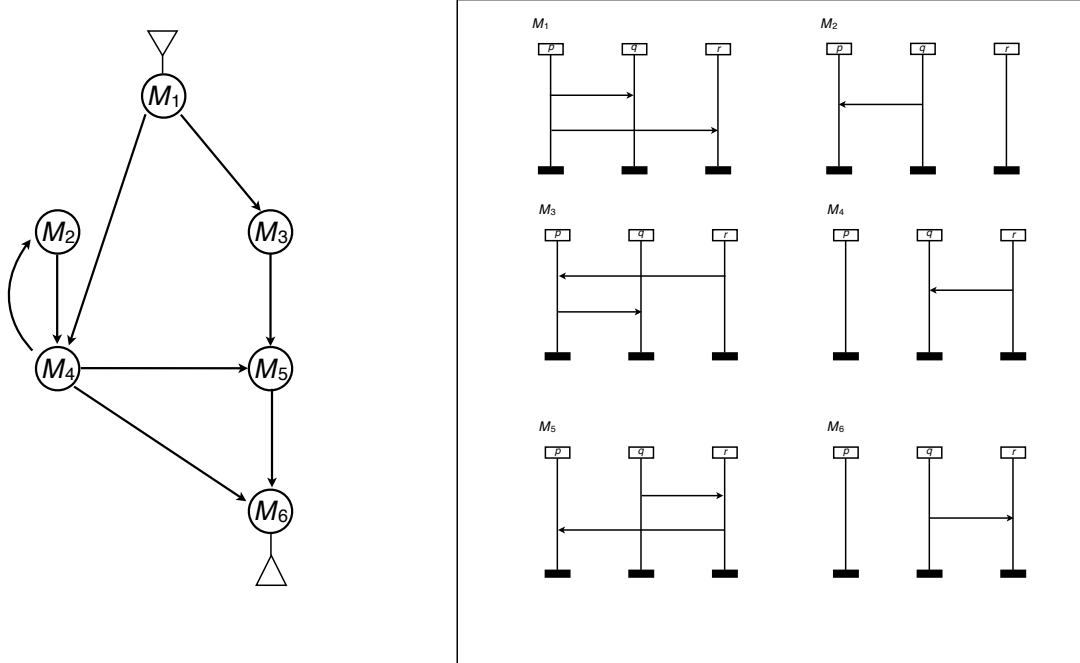


Check whether the following regular expressions are realisable or not:

- $\alpha_1 = M_1^* + M_2^*$
- $\alpha_2 = (M_1 \cdot M_2)^*$
- $\alpha_3 = M_2 \cdot (M_2 \cdot M_1 + M_1)^*$

and if so, whether they can be realized by a universally or existentially bounded CFM?

II. Given a local-choice MSG \mathcal{G} with $P = \{p, q, r\}$ and $v_i = M_i$ (for $i \in \{1, \dots, 6\}$) and as follows:



Construct a deadlock-free CFM \mathcal{A} according to the algorithm presented in the lecture. Determine, moreover, for every node $v \in V$ of \mathcal{G} the maximal non-branching path $nbp(v)$.