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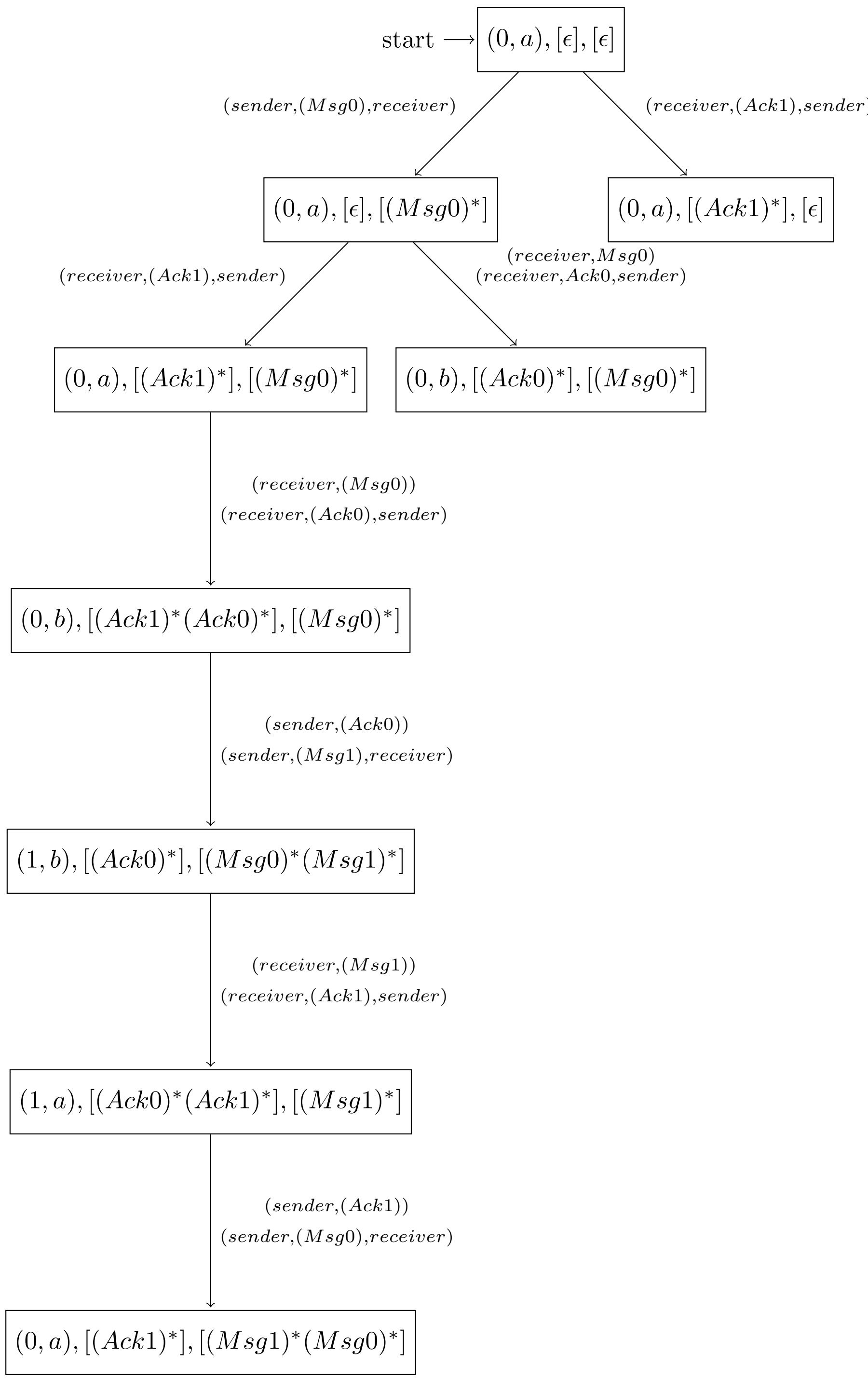
In the following the transition $(i, A, j)$ means that $i$ sends $A$ to $j$ and $(i, A)$ means that $i$ receives $A$. I have taken mostly two transitions together and there are always accelerations taken to get from one ideal to the next one. There is much missing on the right, only the left branch is complete, but the left branch contains already the covering set, since on the right one would get exactly the same ideals. The covering set is exactly the union of the four last ideals on the left branch. (I used regular expressions for the ideals, so an $\epsilon$ means the ideal consisting only of an empty channel. The ideal coming first is describing the content of the channel of the sender and the second ideal corresponds to the receiver)


start
$(0, a), [\epsilon], [\epsilon]$
$(sender,(Msg0),receiver)$
$(receiver,(Ack1),sender)$
$(0, a), [\epsilon], [(Msg0)^*]$
$(0, a), [(Ack1)^*], [\epsilon]$
$(receiver,(Ack1),sender)$
$(receiver,Msg0)$
$(receiver,Ack0,sender)$
$(0, a), [(Ack1)^*], [(Msg0)^*]$
$(0, b), [(Ack0)^*], [(Msg0)^*]$
$(receiver,(Msg0))$
$(receiver,(Ack0),sender)$
$(0, b), [(Ack1)^*(Ack0)^*], [(Msg0)^*]$
$(sender,(Ack0))$
$(sender,(Msg1),receiver)$
$(1, b), [(Ack0)^*], [(Msg0)^*(Msg1)^*]$
$(receiver,(Msg1))$
$(receiver,(Ack1),sender)$
$(1, a), [(Ack0)^*(Ack1)^*], [(Msg1)^*]$
$(sender,(Ack1))$
$(sender,(Msg0),receiver)$
$(0, a), [(Ack1)^*], [(Msg1)^*(Msg0)^*]$

## 2

### 2.1

For a given CSM the corresponding Petri Net is contructed by defining for any machine $M_i$ for any alphabet symbol a place (so already $\sum$- many places) and additionaly a place for any state in $M_i$. For any sending operation of the CSM

$$(M(i) = s_i, M_j!a, s_j)$$

(in words the $i$-th machine changes from state $s_i$ to $s_j$ when sending $a$ to $M_j$) one defines the transition $t$ by

(let $p_i$ and $p_j$ denote the places corresponding to the states $s_i$ and resp. $s_j$ of $M_i$ and let $p_a$ denote the place corresponding to the alphabet symbol $a$ for $M_j$)

$$W(p_i, t) = 1; W(t, p_j) = 1; W(t, p_a) = 1;$$

and for a receive operation

$$(M(i) = s_i, ?a, s_j)$$

very similar (but the $p_a$ now corresponds to a place of $M_i$)

$$W(p_i, t) = 1; W(t, p_j) = 1; W(p_a, t) = 1;$$

Since for any state $(M_i, s_i)$ (meaning state $s_i$ of machine $M_i$) in the CSM there is a corresponding place in the petri net one can for a control state $M_i$, $s_i$ simply take the marking $M$ where all the corresponding places of the control state get a 1 and else 0.

The number of places is (since for any machine $M_i$ one has at most $\sum + m$) $N * (m + \sum)$