Formal Models SS 2015: Assignment 6

Institute for Formal Models and Verification, JKU Linz

Due 07.05.2015

Exercise 21
Let \( P = b.c.P \) and \( Q = a.b.Q \). Show that action
\[
((b.Q + b.a.Q) \,|\, (b.P + b.c.P)) + (a.Q \,|\, b.P) \xrightarrow{b} a.Q \,|\, P
\]
can be executed by subsequently applying the semantical rules of PA.

Exercise 22
Given a CEN \( N = (C, I, E, G) \) with \( C = \{r,s,t,u,v,w\} \), \( I = \{r,v\} \), \( E = \{b,c,d,e\} \),
\( G = \{(r,b),(b,s),(t,b),(s,c),(c,r),(d,t),(d,u),(u,e),(e,v),(v,d),(w,b),(d,w)\} \).

Draw the CEN \( N \). How many markings are possible on \( N \) theoretically?

a) Draw the CEN \( N \).

b) Given marking \( \{u\} \), what is the marking obtained when event \( d \) fires?

c) Given marking \( \{s,t,u\} \), what is the marking obtained when event \( d \) fires?

d) Given marking \( \{r,u\} \), what is the marking obtained when event \( e \) fires?

Exercise 23
Let \( L \) be the LTS corresponding to the CEN \( N \) from the previous exercise. Draw \( L \).

Exercise 24
Given a CEN \( N = (C, I, E, G) \) with \( C = \{r,s,t,u\} \), \( I = \{r,s\} \), \( E = \{b,c,d,e\} \),
\( G = \{(r,b),(r,c),(s,c),(t,e),(u,d),(e,u),(c,t),(c,u),(b,s),(d,r)\} \)

a) Draw the CEN \( N \). How many markings are possible on \( N \) theoretically?

b) Starting from the initial marking \( I \), can a deadlock be reached on \( N \)? Justify your answer!