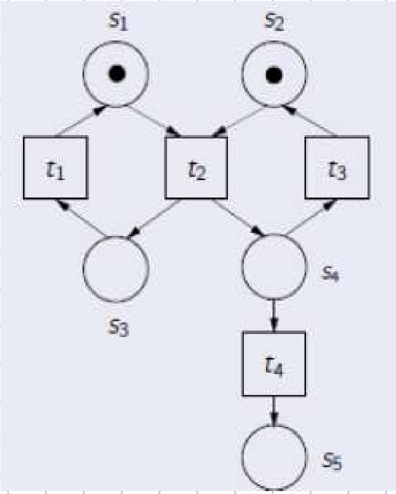
Modellierung 20.11.13

Notiztitel 20.11.2013



$$\vartheta \cdot \begin{array}{c|cccc} & t_1 & t_2 & t_3 & t_4 \\ \hline s_1 & 1 & -1 & 0 & 0 \\ s_2 & 0 & -1 & 1 & 0 \\ s_3 & -1 & 1 & 0 & 0 \\ s_4 & 0 & 1 & -1 & -1 \\ s_5 & 0 & 0 & 0 & 1 \end{array} = (0\ 0\ 0\ 0)$$

$\vartheta_1 - \vartheta_3 = 0 \quad | \ \vartheta_1 = \vartheta_3$

$-\vartheta_1 - \vartheta_2 + \vartheta_3 + \vartheta_4 = 0$

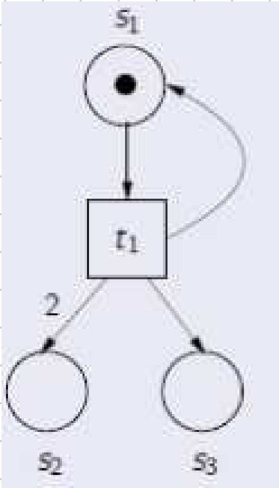
$\vartheta_2 - \vartheta_4 = 0 \quad | \ \vartheta_2 = \vartheta_4$

$-\vartheta_4 + \vartheta_5 = 0 \quad | \ \vartheta_4 = \vartheta_5 = \vartheta_2$

$v = (a\ b\ a\ b\ b) = a(1\,0\,1\,0\,0) + b(0\,1\,0\,1\,1)$

$v \cdot \vec{m} = (a\ b\ a\ b\ b) \cdot \begin{pmatrix} 0 \\ 0 \\ 1 \\ 1 \\ 1 \end{pmatrix} = a + 2b \quad | \quad \vec{\vartheta} \cdot \vec{m_0} = (a\ b\ a\ b\ b) \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} = a + b$

$\neq$



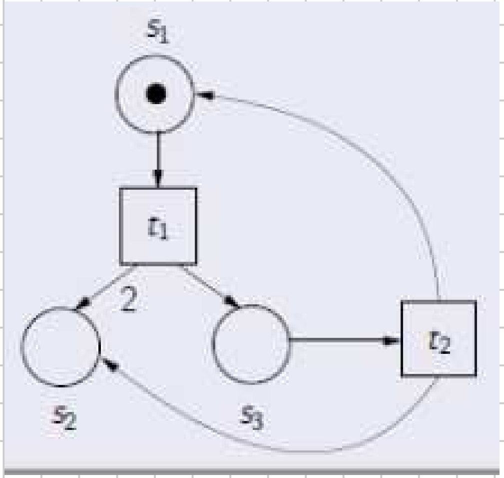
$$(\vartheta_1\ \vartheta_2\ \vartheta_3) \cdot \begin{pmatrix} 0 \\ 2 \\ 1 \end{pmatrix} = 0 \Leftrightarrow 2\vartheta_2 + \vartheta_3 = 0$$

$$\vartheta_3 = -2\vartheta_2$$

$$\vartheta = \ell \cdot (0\ 1\ -2)$$

$$\vartheta \cdot \vec{m} = 0 m_1 + m_2 - 2m_3 = 0 \Rightarrow m_2 = 2m_3$$

$$\vartheta \cdot m_0 = 0 = 0 \cdot 1$$



$$\begin{array}{c|cc} & t_1 & t_2 \\ \hline s_1 & -1 & 1 \\ s_2 & 2 & 1 \\ s_3 & 1 & -1 \end{array}$$

$$-v_1 + 2v_2 + v_3 = 0$$
$$v_1 + v_2 - v_3 = 0$$
$$\overline{\qquad\qquad\qquad}$$
$$v_2 = 0$$
$$v_1 = v_3$$

$$v = \ell \cdot (1\ 0\ 1)$$

$$v \cdot \vec{m}_0 = (1\,0\,1) \cdot \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} = 1$$
$$\shortparallel \qquad\qquad\qquad \shortparallel$$
$$v \cdot \vec{m} = (1\,0\,1) \cdot \begin{pmatrix} 1 \\ 2\,0 \\ 0 \end{pmatrix} = 1$$

gemäß S-Invariante erreichbar, tatsächlich aber nicht!

$$\begin{array}{c|cccc} & t_1 & nt_1 & t_2 & nt_2 \\ \hline K_1 & 1 & -1 & 0 & 0 \\ NK_1 & -1 & 1 & 0 & 0 \\ K_2 & 0 & 0 & 1 & -1 \\ NK_2 & 0 & 0 & -1 & 1 \\ S & -1 & 1 & -1 & 1 \end{array}$$

$$\left.\begin{aligned} v_1 - v_2 - v_5 &= 0 \\ -v_1 + v_2 + v_5 &= 0 \end{aligned}\right\} v_1 = v_2 + v_5$$

$$\left.\begin{aligned} v_3 - v_4 - v_5 &= 0 \\ -v_3 + v_4 + v_5 &= 0 \end{aligned}\right\} v_3 = v_4 + v_5$$

$$v = (v_2 + v_5,\ v_2,\ v_4 + v_5,\ v_4,\ v_5)$$

$$= v_2(1\ 1\ 0\ 0\ 0) + v_4(0\ 0\ 1\ 1\ 0) + \underline{v_5(1\ 0\ 1\ 0\ 1)}$$

$$v \cdot \vec{m} = m_1 + m_3 + m_5 \overset{!}{=} v \cdot \vec{m}_0 = v \cdot \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 1 \end{pmatrix} = 1$$

Annahme: auf K_1 und K_2 jeweils mind. 1 Marke

$m_1 \geq 1,\ m_3 \geq 1 \Rightarrow 2 \leq m_1 + m_2 + m_3 = 1$

$\Rightarrow$ Widerspruch! $\Rightarrow m_1 + m_3 \leq 1$

$$\begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \end{array}\begin{pmatrix} -1 & 0 & 1 & -1 & 0 & 1 \\ 0 & -1 & 1 & 0 & -1 & 1 \\ -1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 0 & 1 \\ 1 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & -1 & 0 \\ 0 & 1 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & -1 \end{pmatrix}$$

$-\vartheta_1 - \vartheta_3 + \vartheta_5 = 0 \quad | \quad \vartheta_5 = \vartheta_1 + \vartheta_3$

$-\vartheta_2 - \vartheta_5 + \vartheta_7 = 0$

$\vartheta_1 + \vartheta_2 + \vartheta_3 - \vartheta_7 = 0 \qquad \vartheta_7 = \vartheta_1 + \vartheta_2 + \vartheta_3$

$-\vartheta_1 - \vartheta_4 + \vartheta_6 = 0 \qquad \vartheta_6 = \vartheta_1 + \vartheta_4$

$-\vartheta_2 - \vartheta_6 + \vartheta_8 = 0$

$\vartheta_1 + \vartheta_2 + \vartheta_4 - \vartheta_8 = 0 \qquad \vartheta_8 = \vartheta_1 + \vartheta_2 + \vartheta_4$

$\vartheta_1, \vartheta_2, \vartheta_3, \vartheta_4, \vartheta_1 + \vartheta_3, \vartheta_1 + \vartheta_4, \vartheta_1 + \vartheta_2 + \vartheta_3, \vartheta_1 + \vartheta_2 + \vartheta_4$

$\vartheta_1 (1\ 0\ 0\ 0\ 1\ 1\ 1\ 1) + \vartheta_2 (0\ 1\ 0\ 0\ 0\ 0\ 1\ 1) +$

$\vartheta_3 (0\ 0\ 1\ 0\ 1\ 0\ 1\ 0) + \vartheta_4 (0\ 0\ 0\ 1\ 0\ 1\ 0\ 1)$

$(1\ 0\ 0\ 0\ 1\ 1\ 1\ 1) \cdot \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} = 1$ $\qquad \vartheta \cdot \vec{m} = 2$

$\vartheta \cdot \vec{m}_0$

$\vartheta \cdot \vec{m}_0 \neq \vartheta \cdot \vec{m}$

$\Rightarrow \vec{m}$ ist nicht erreichbar