

Solutions for Tutorial 9 (Petri Nets)

1. Give the Matrices E^+ , E^- and m_0 of the Petri Net below.
2. Draw the reachability graph of the Petri Net below.

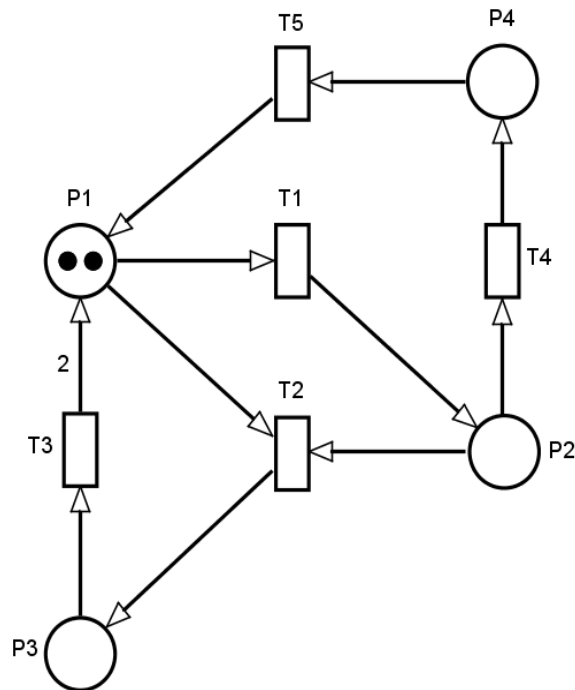


Figure 1 Petri Net for Exercise 1 and 2

3. Draw the Petri Net with following Matrices:

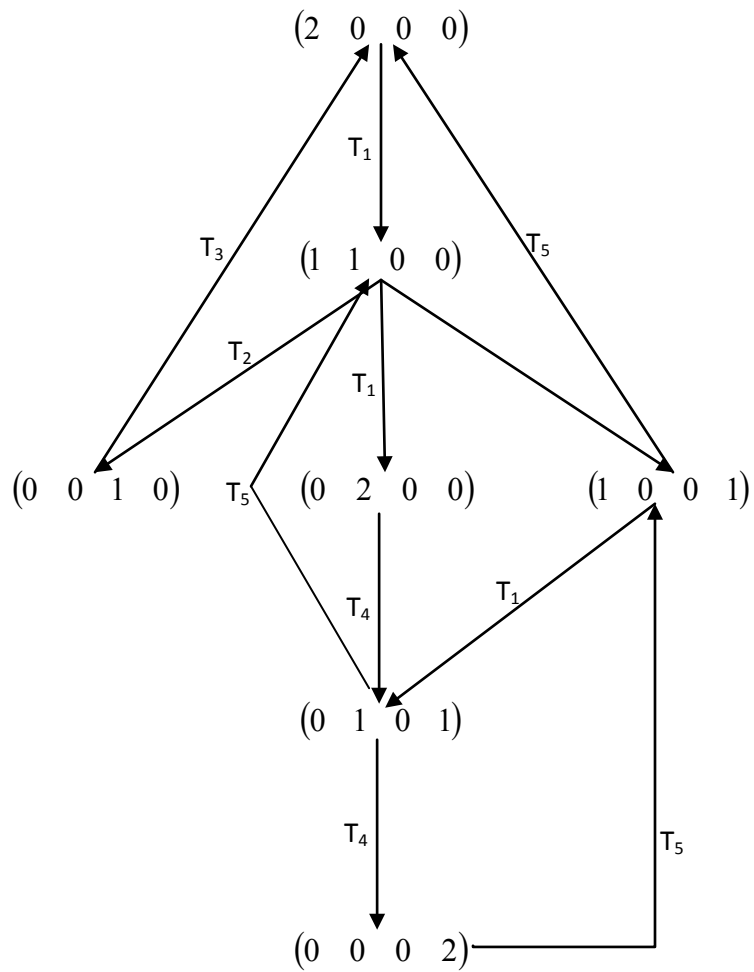
$$E^+ = \begin{pmatrix} 2 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \end{pmatrix} \quad E^- = \begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \quad m_0 = \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \\ 1 \end{pmatrix}$$

Draw the Petri Net after the first switch, concerning the final state with only one token remaining

Solutions

1.
$$E^+ = \begin{pmatrix} 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix} \quad E^- = \begin{pmatrix} 0 & 0 & 2 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \end{pmatrix} \quad m_0 = \begin{pmatrix} 2 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

2. The reachability graph looks like this:



3. The Petri net is illustrated in figure 1. If we want only one token left in the final state, T_3 has to fire first.

Otherwise if T_2 fires first, we have two tokens in P_1 and one in P_5 , after T_1 fires we reach the final state with one token in P_3 and one in P_5 .

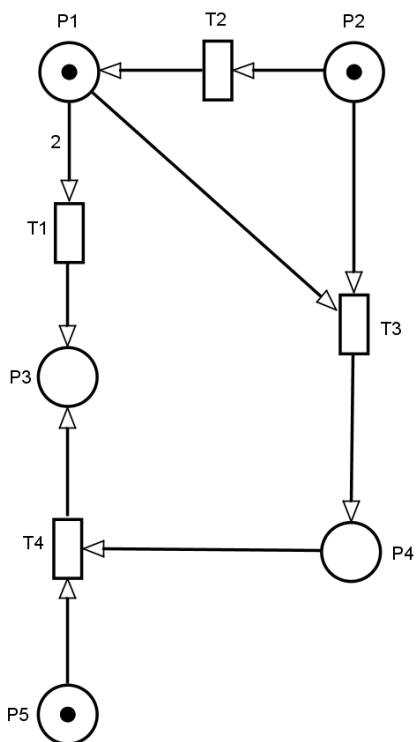


Figure 1 Petri Net

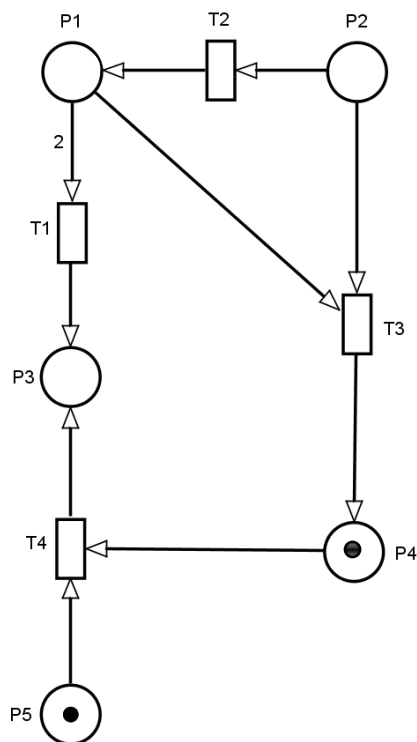


Figure 2 Petri Net after first switch