Information Systems Analysis

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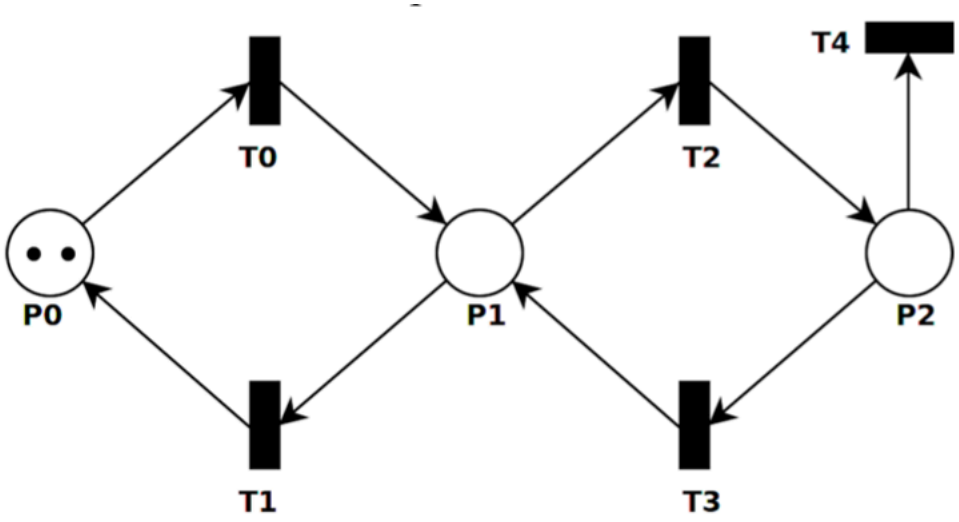
Exercise 1:

Todo: Make a formal description of this Petri net.

A Petri net consists of places, transitions, and arcs. Arcs run from a place to a transition or vice versa, never between places or between transitions. The places from which an arc runs to a transition are called the input places of the transition; the places to which arcs run from a transition are called the output places of the transition.

Solution:



P.N = <P,T,F,H,W,C,M_0

where

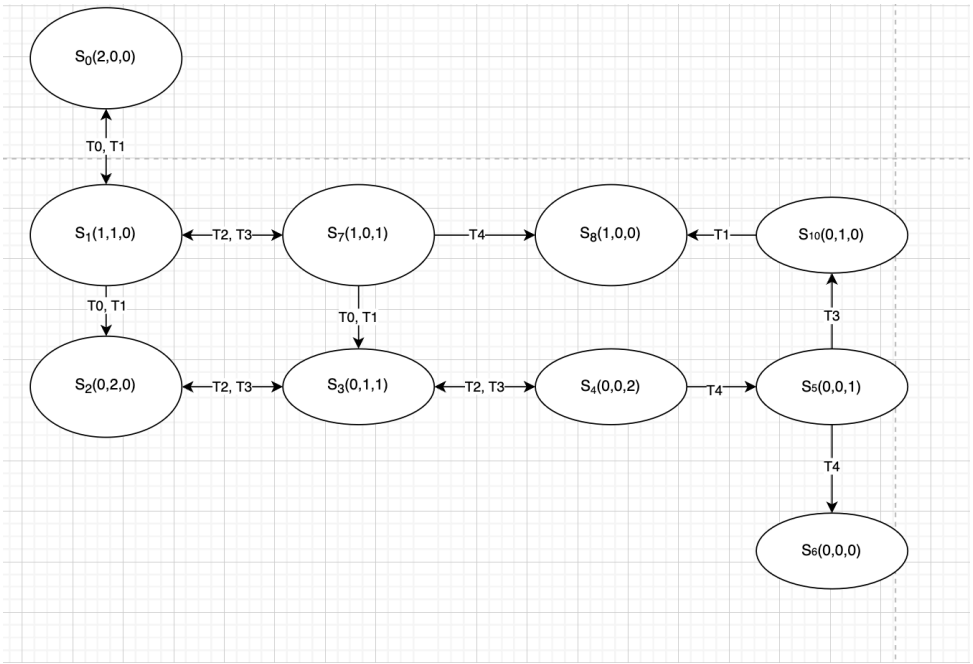
P	Set of places	$\{P_0, P_1, P_2\}$
T	Set of transitions	$\{T_0,T_1,T_2,T_3, T_4\}$
F	Set of arcs - $(P * T) \cup (T * P)$	$\{P_0T_0\}$, $\{P_0T_1\}$, $\{P_1T_0\}$, $\{P_1T_1\}$, $\{P_1T_2\}$, $\{P_1T_3\}$, $\{P_2T_2\}$, $\{P_2T_3\}$, $\{P_2T_4\}$,
W	Weight	$\{1,1,1,1,1,1,1,1,1\}$

C	A place capacity	$\{\infty,\infty,\infty\}$
M_0	Initial marking	$\{2,0,0\}$

Exercise 2:

TODO: Reachability Graph

Solution:



Exercise 3:

TODO: Based on simulation of the net of the first exercise and the reachability graph of the second exercise, make a behavioral analysis of this net, to check its:

– boundedness,

– safety,

– conservativeness,

– lifeness,

– reversibility,

– persistence.

Explain every answer.

Solution:

Boundedness: The net is **2 bounded** because all points have reached to 2 tokens. (S_0, S_2, S_4)
Safety: A net **is not safe** because it is 2 bounded.
Conservativeness: A net **is not conservative** because tokens are changes in all points.
Liveness: It's **not liveness** because we can't trigger any transition in S10
Reversibility: **It's not reversible** because initial state is not reachable from all its reachable states
Persistence: It's **not persistent** because when its {1,1,0}, if we trigger T2, we will not be able to trigger T1

Exercise 4:

TODO: Expand the net, to limit the number of tokens in the place p2 to 2. The rest of the net's behavior must not change.