EE249 Homework 3

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Goal of HW3 is to apply some algorithms on models like Data-Flow and Petri-Nets and use Metroplis for implementing a model. **General Comments:** *an answer to a problem is neither right nor wrong (but there are exceptions of course). I would rather consider your homework as solutions to design problems. I could argue that your solution is inefficient and you could argue the same about mine. Grade is established mostly on the reasoning that you follow to answer the questions. Hence it is in your interest to justify your claims. You can use any kind of sources as long as you include references.*

QUESTION 1: Consider the data flow graph in figure .
Determine;

- the balance equations and a periodic firing vector;

- a valid single appearance schedule and add delays on edges (you can choose how) to make the schedule valid;

- the buffer memory lower bound for a single appearance schedule as defined in [P.K. Murthy et. al, "Joint Minimization of Code and Data for Synchronous Data Flow Programs"];

- the lower bound on the amount of memory required by any schedule;

- the buffer requirement of your schedule;

- neglecting the single appearance assumption, find a schedule with lower memory requirements;

QUESTION 2: Given the Petri-Net PN1 in figure

- derive its coverability tree;
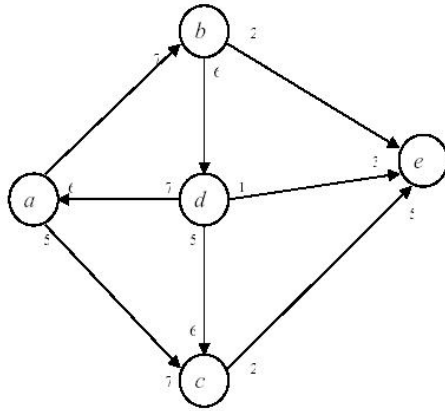
- find a Petri-Net PN2 such that:

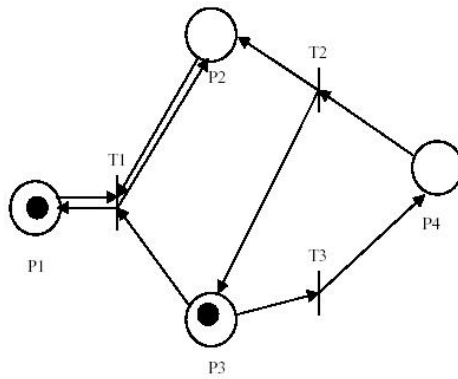Figure 1: The data flow graph of question 1

Figure 2: The Petri-Net of question 2

      – the coverability tree of PN2 is the same of that of PN1

      – in PN2 marhing $M = (1, 1, 0, 0)$ is not reachable from the initial marking $M_0 = (1, 0, 1, 0)$.

QUESTION 3: Implement a set of classes called `Place` and `Transition` in the Metropolis framework in such a way that any legal composition of those classes is a Petri-Net.