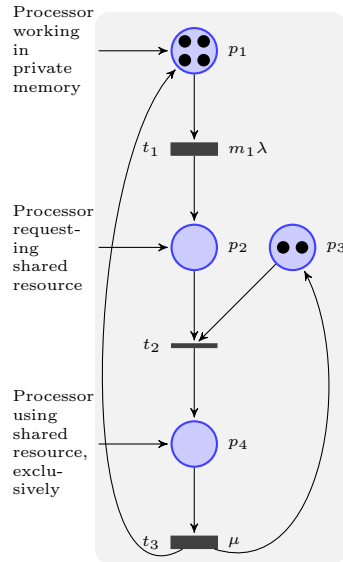


GSPN Homework

- Q 1.** Assume we have the following GSPN representing four processors sharing two resources.



- (i) Find the generator matrix of the marking process.
 - (ii) What's the contention of the system in comparison to when there is only a single resource? Contention is in this case the probability of having at least one token in place p_2 .
- Q 2.** In an automated widget factory, widgets are assembled from two parts, an A part and a B part. A parts are processed by machine 1 while B parts are processed by machine 2; machine 3 then assembles one A part and one B part to make one widget. A single robot transports parts from a conveyor belt to the appropriate machine; it is also responsible for moving completed A parts from machine 1 to machine 3, and completed B parts from machine 2 to machine 3. Machine 1 cannot start to load the next A part until the current one has been moved to machine 3; similarly for machine 2 and B parts. Machine 3 cannot accept parts of either kind until it has completed the assembly of the previous widget. There are always A and B parts available from the conveyor belt. If both machine 1 and machine 2 need to use the robot at the same time they are equally likely to acquire it. Loading parts from the conveyor belt, or transferring them to machine 3 takes 10 seconds on average. The mean duration of processing A parts at machine 1 is 125 seconds, while the mean duration of processing B

parts at machine 2 is 200 seconds. Assembling a widget from A and B parts takes 100 seconds on average.

- (i) Model this manufacturing system as a GSPN.
- (ii) Generate the corresponding marking process (hint: it will be finite).
- (iii) Calculate the utilization of each of the 3 machines.
- (iv) Calculate the throughput of the total system. (i.e., the number of widgets that leave machine 3 per t.u.)