

22C: 166 Distributed Systems and Algorithms

Homework 2, Total points = 50

Assigned 9/20/07 due 9/27/07 in class

Please submit typewritten solutions.

Late assignments will not be accepted without prior approval.

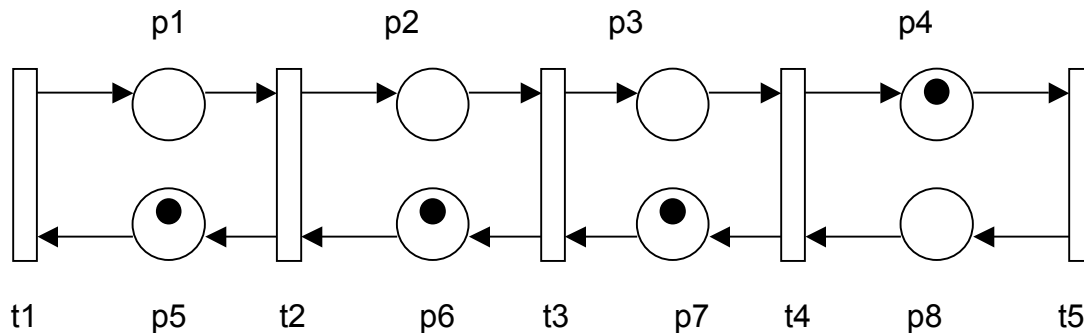
Question 1. (15 points) Chapter 5 Exercise 5

Question 2. (15 points) Chapter 5 Exercise 6

Question 3 (10 points)

This question asks you to study *reachability*. Reachability is a liveness property. A global state S' is *reachable* from another global state S , if there exists a valid computation (i.e. a sequence of states and state transitions) that leads the systems from S to S' . We consider an example from Petri nets that represent asynchronous control structures.

In a Petri net, each circle is called a place and it denotes a condition. Each box represents a transition that represents an event. A token in a place implies that the condition holds. For a given transition, if every input place has a token, then the transition fires (i.e the event takes place), all tokens disappear from the input places, and every output place of the transition acquires a token. The global state consists of the set of places that have a token.



Let $S = \{p4, p5, p6, p7\}$ and $S' = \{p1, p2, p3, p8\}$ Is S' reachable from S ? Justify your answer.

Question 4. (10 points)

In a computation running on a distributed system, let S be the initial state, and S' be a terminal state (a state in which the system does not have any eligible action, and all channels are empty). Also, assume that S' is *reachable* from S . Will the distributed computation always terminate?

Explain your answer. If necessary, use examples.