

2.5 Synchronization Control

In a multiprocessor or distributed processing system, resources and information are shared among several processors. This sharing must be controlled or synchronized to insure the correct operation of the overall system. Petri nets have been used to model a variety of synchronization mechanisms, including the mutual exclusion, readers-writers, and producers-consumers problems. The Petri net shown in Fig. 2.10 represents a readers-writers synchronization, where the k tokens in place p_1 represent k processes (programs) which may read and write in a shared memory represented by place p_3 . Up to k processes may be reading concurrently, but when one process is writing, no other process can be reading or writing. It is easily verified that up to k tokens (processes) may be in place p_2 (reading) if no token is in place p_4 , and that only one token (process) can be in place p_4 (writing) since all k tokens in place p_3 will be removed through the k -weight arc when t_2 fires once. This Petri net will be analyzed in Example 7.5 in Chapter 7.

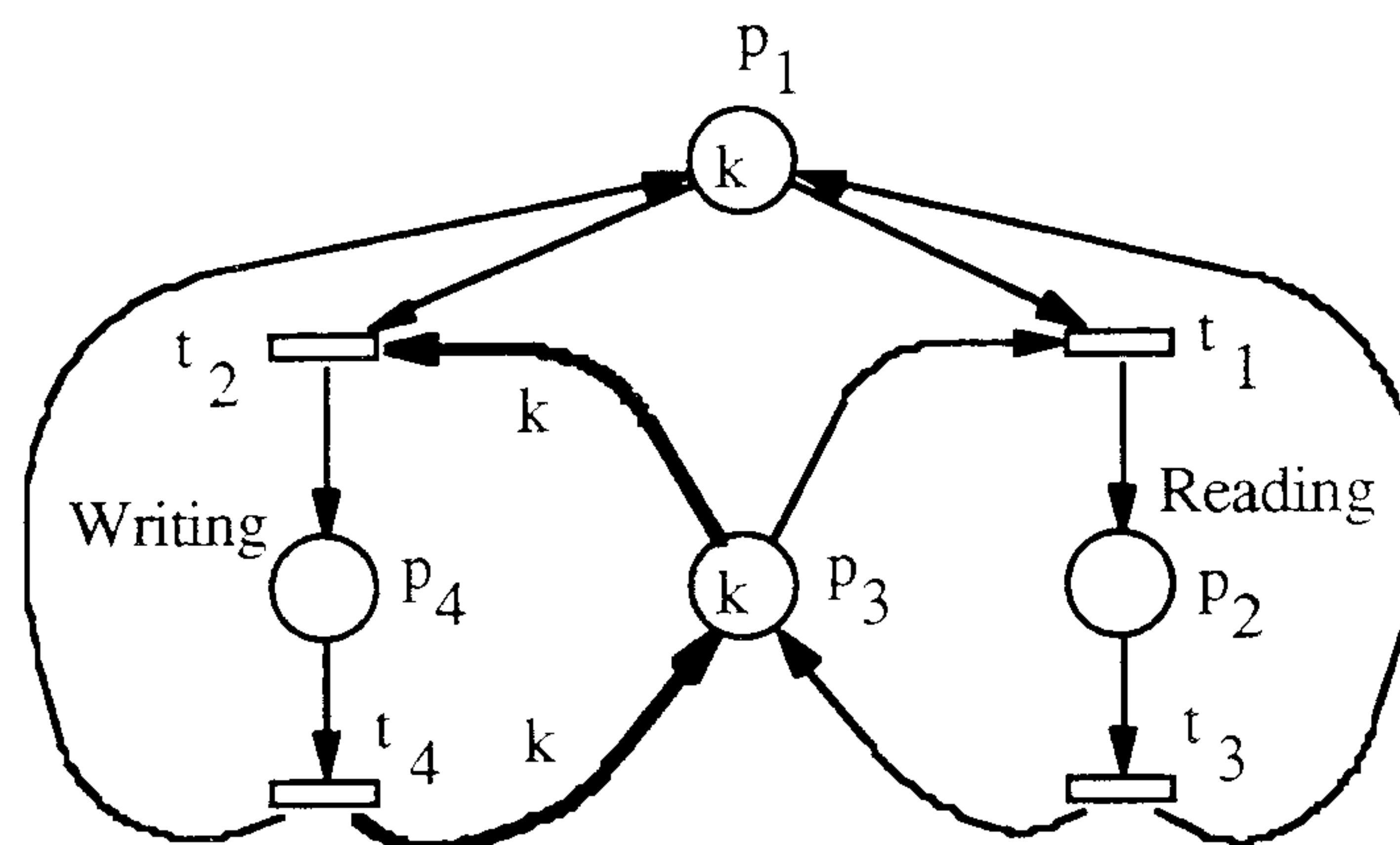


Fig.2.10. A Petri-net representation of a readers-writers system.

2.6 Producers-Consumers System with Priority