PETRI NET

LECTURE # 38

PRIMITIVE STRUCTURES

sequence

conflict

concurrency

synchronization

confusion

merging

priority/inhibit
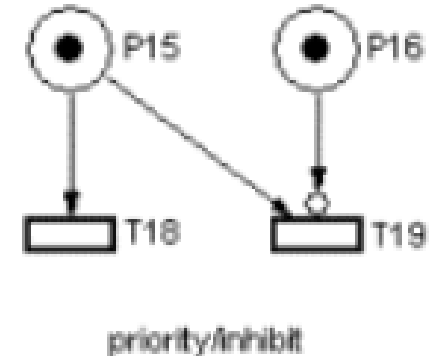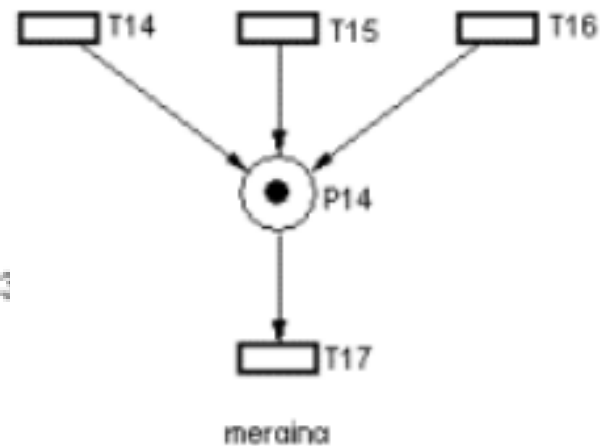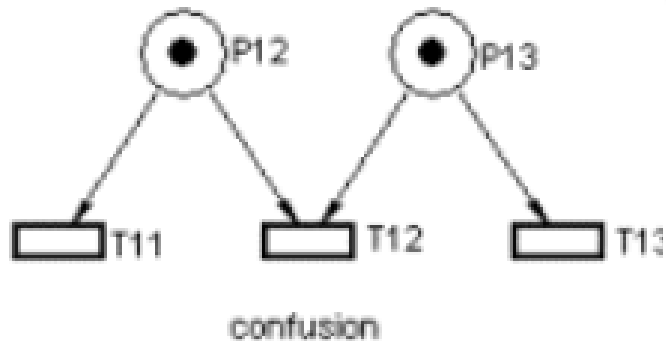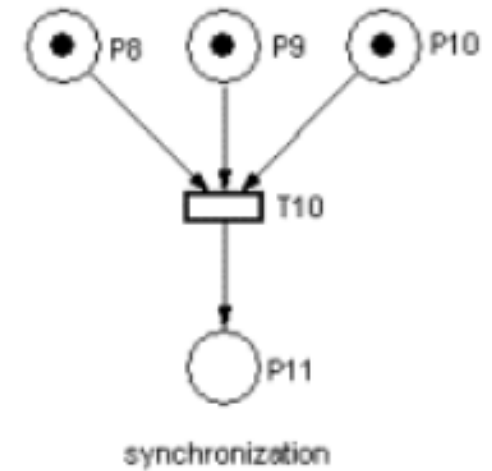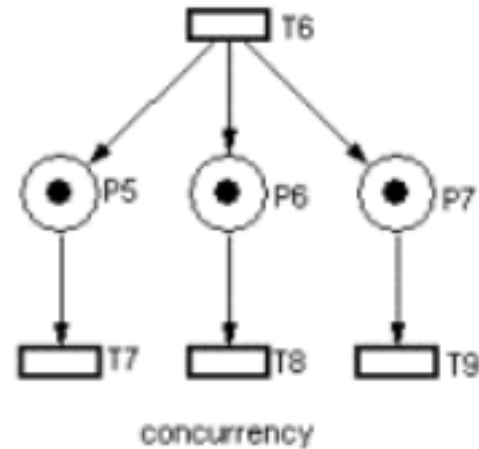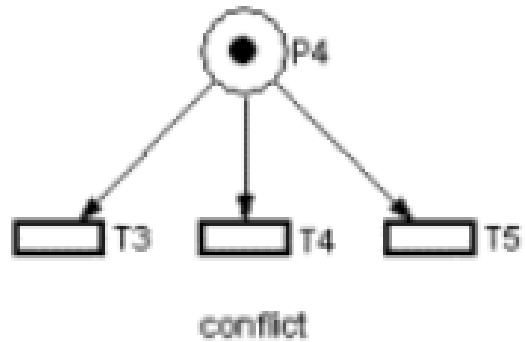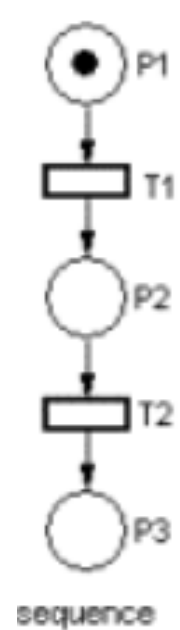
PROPERTIES OF PETRI NETS

- ## Reachability:

  - A marking is reachable from another marking if there exists a sequence of transition firings starting from the original marking that results in the new marking.

 - Reachability set: $R(M_0)$ is set of all possible markings reachable from the initial marking M_0.

PROPERTIES OF PETRI NETS

- ## Reachability Graph:

  - A reachability graph is a directed graph whose nodes are the markings in the reachability set, with directed arcs between the markings representing the marking-to-marking transitions.

  - The directed arcs are labeled with the corresponding transition whose firing results in a change of the marking from the original marking to the new marking

  - Reachability graph is transition system with one initial marking and no explicit final marking

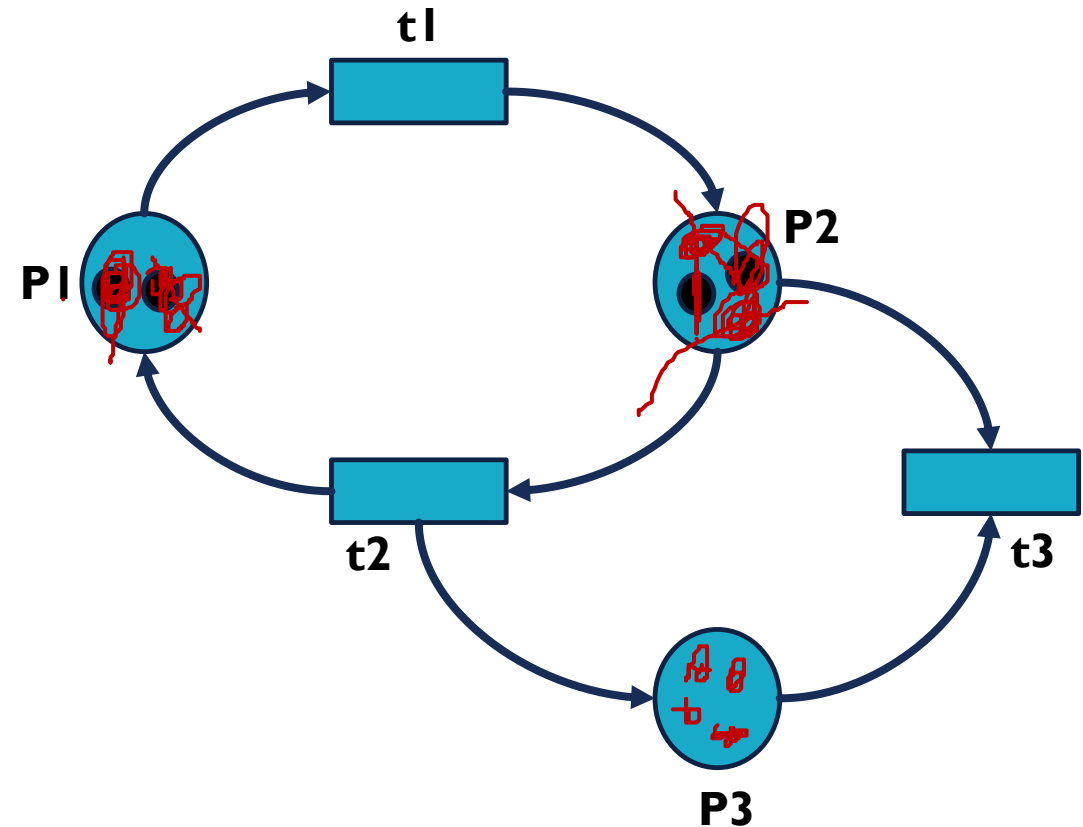# Properties of Petri Nets (Reachability Example)
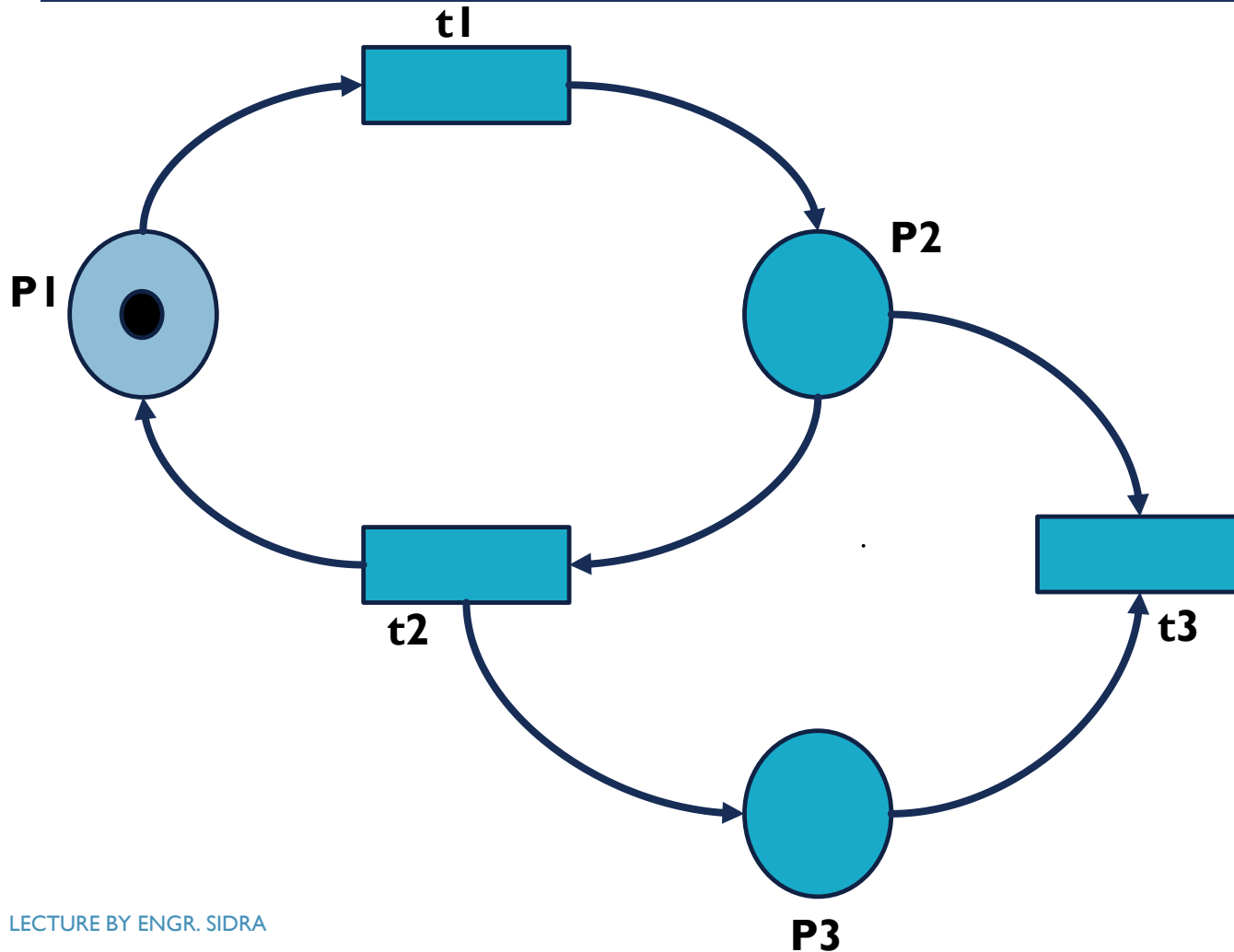
$$[P1]$$
$$\downarrow \; t1$$
$$[P2]$$
$$\downarrow \; t2$$
$$[P1,P3]$$
$$\downarrow \; t1$$
$$[P2,P3]$$
$$\downarrow \; t2$$
$$[P1,P3^2]$$
$$\downarrow \; t1$$
$$[P2,P3^2]$$
$$\downarrow \; t2$$
$$[P1,P3^3]$$

PROPERTIES OF PETRI NETS

Boundedness:

- A place 'P' is k-bounded if there is no reachable marking with more than k-tokens in P.

- Net is K-bounded if all places are k-bounded.

- It is called safe if k=1.

- P1 is 2 bounded

- P2 is 2 bounded

- P3 is unbounded

PROPERTIES OF PETRI NETS

- ## Liveness:

  - A transition 't' is live if from any reachable marking it is possible to reach a marking that enables 't'.

  - Net is live if all transitions are live

  - Net that is live is deadlock free.