

PETRI NET

LECTURE # 37

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PETRI NET

- It is also known as Place/Transition (PT) net.
- It is a graphical and mathematical modeling tool used to describe and study information processing systems of various types.
- Class of discrete event dynamic systems
- Mathematical modeling language for description of parallel/distributed systems to describe state change in system with transition.
- It is directed Bipartite graph in which nodes represents transitions (i.e., action/events that may occur, represented by bars) and Places (i.e., conditions/resources/states represent by circle).
- Execution of Petri nets is nondeterministic.
- Use to model concurrent systems and reason about them.



PETRI NET

- **Problems with Concurrency:**

- **Race condition:**

- A **race condition** is an undesirable situation that occurs when a device or **system** attempts to perform two or more operations at the same time, but because of the nature of the device or **system**, the operations must be done in the proper sequence to be done correctly

- **Resource Starvation:**

- It is a problem encountered in concurrent computing where a process is perpetually denied necessary resources to process its work. Starvation may be caused by errors in a scheduling.

- **Deadlock:**

- It is a state in which each member of a group waits for another member, including itself, to take action, such as sending a message or more commonly releasing a lock. Deadlocks are a common problem in multiprocessing systems, parallel computing, and distributed systems.



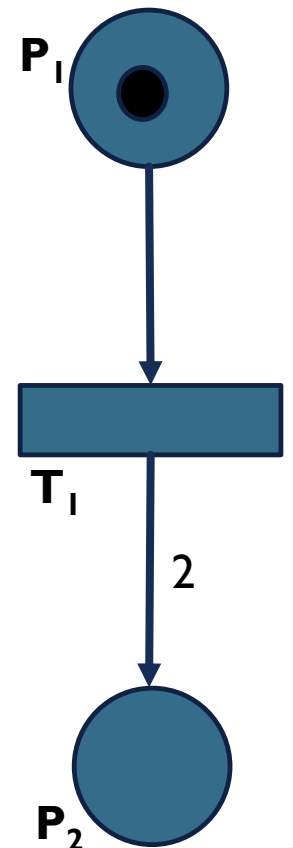
USEFULNESS

- Used to model complex processes
- Can be simulated to illustrate and test system behavior
- Can perform formal analysis to find problems
- Different application of the places and transitions may have different interpretations.



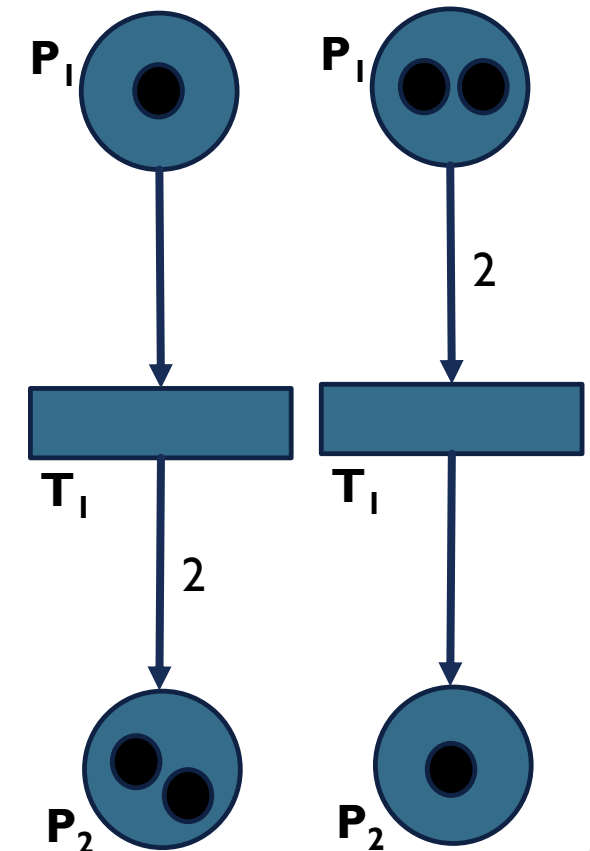
PETRI NET

- It consists of places, transitions and arcs.
- Arcs run from place to transition or vice versa, never between places or transitions.
- Places may contain marks called tokens.
- Any representation of tokens over the places will represents a configuration of net called Marking.
 - Places by default have infinite capacity
 - Transition has no capacity.



PETRI NET

- Transition may fire a token if it is enabled. Firing is atomic.
- Transition is enabled when no. of tokens in each of its i/p place is at-least equal to the arc weight going from P to T.
- When transition fires it consumes required input tokens and create token in output places.
- Transition can create or destroy a token.



PETRI NET

