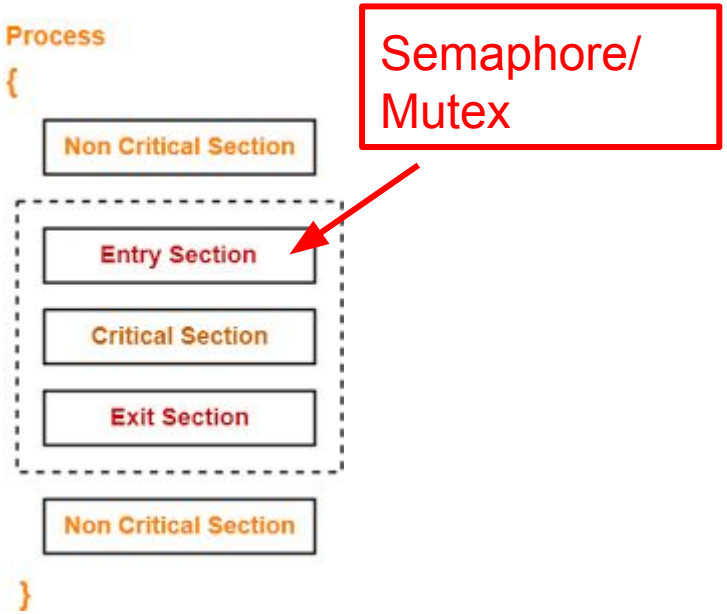
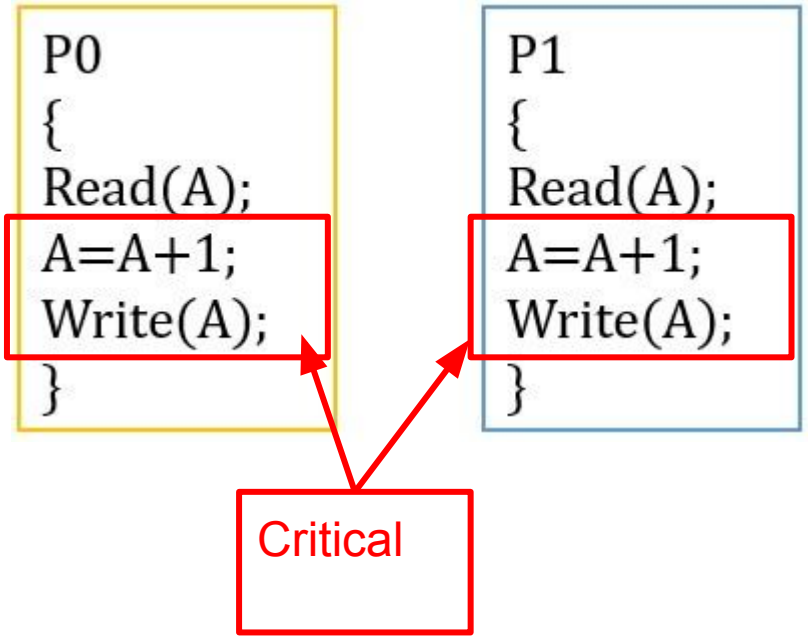
ESD Priority Inversion

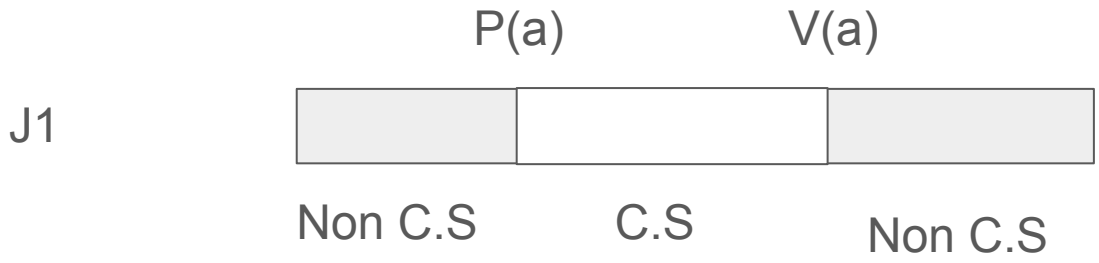
Critical Section





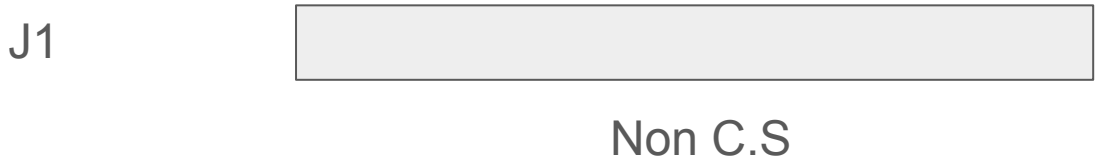
Few Points

- We Assume:
  - a, b, c … can denote resources (e.g. memory, some sensor, etc)
  - P(a) means - locking/acquiring resource ‘a’
  - V(a) means - unlocking/releasing resource ‘a’
  - If a job J1 acquires a resource, no other job (not even higher priority ones) can get the same resource before J1 releases it

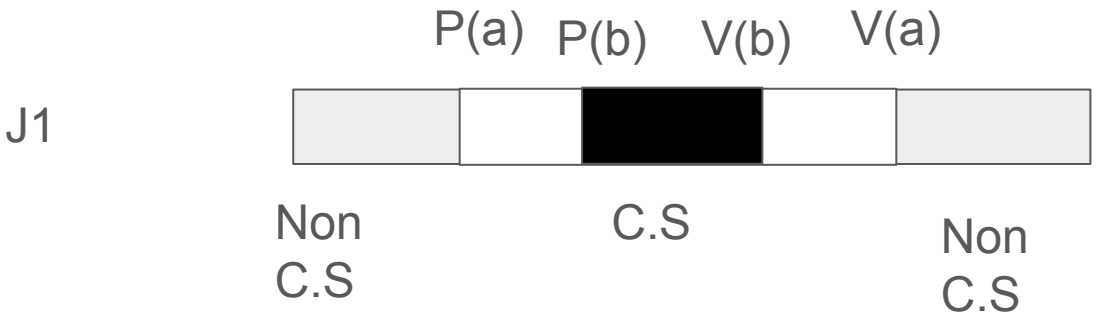


Few Points

- Some Tasks/Jobs/Process DO NOT have any critical section



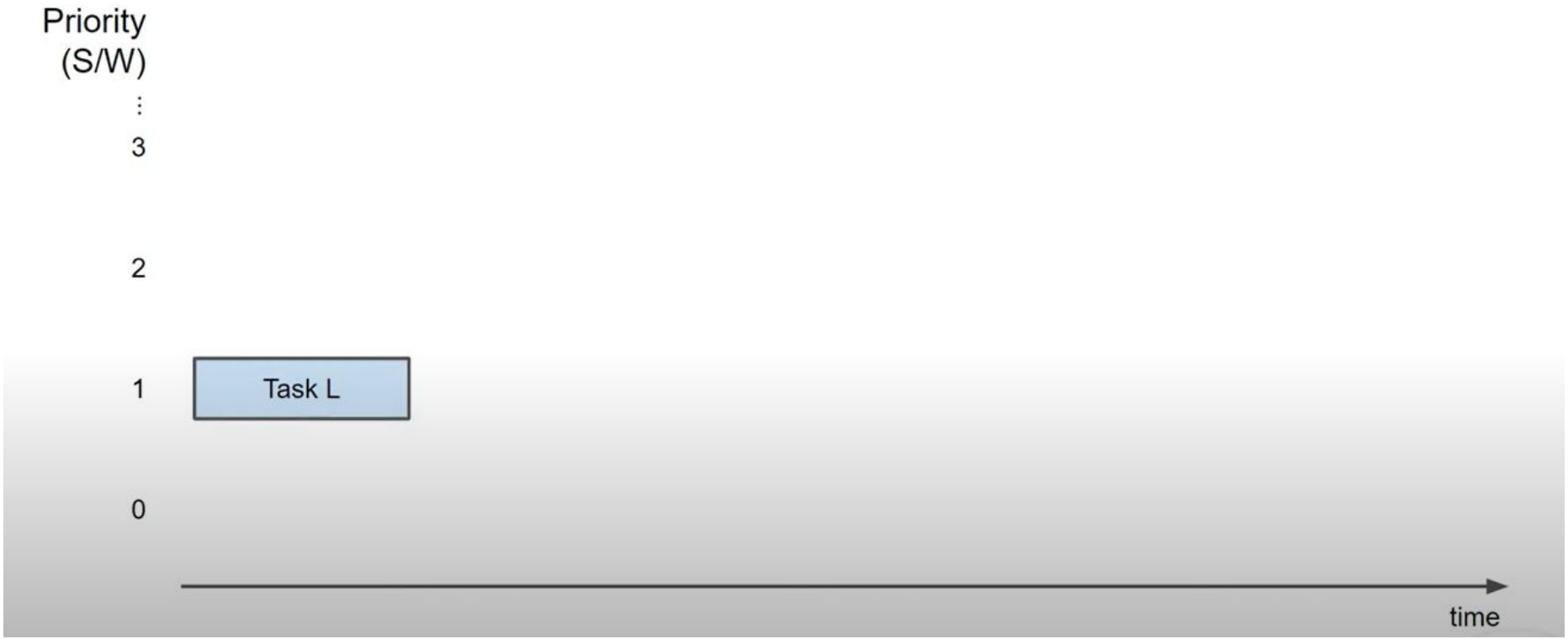
- On the other hand, Some Have.
  - Only 1 critical section (shown in prev page)
  - Multiple critical sections, maybe even nested, or one after another.



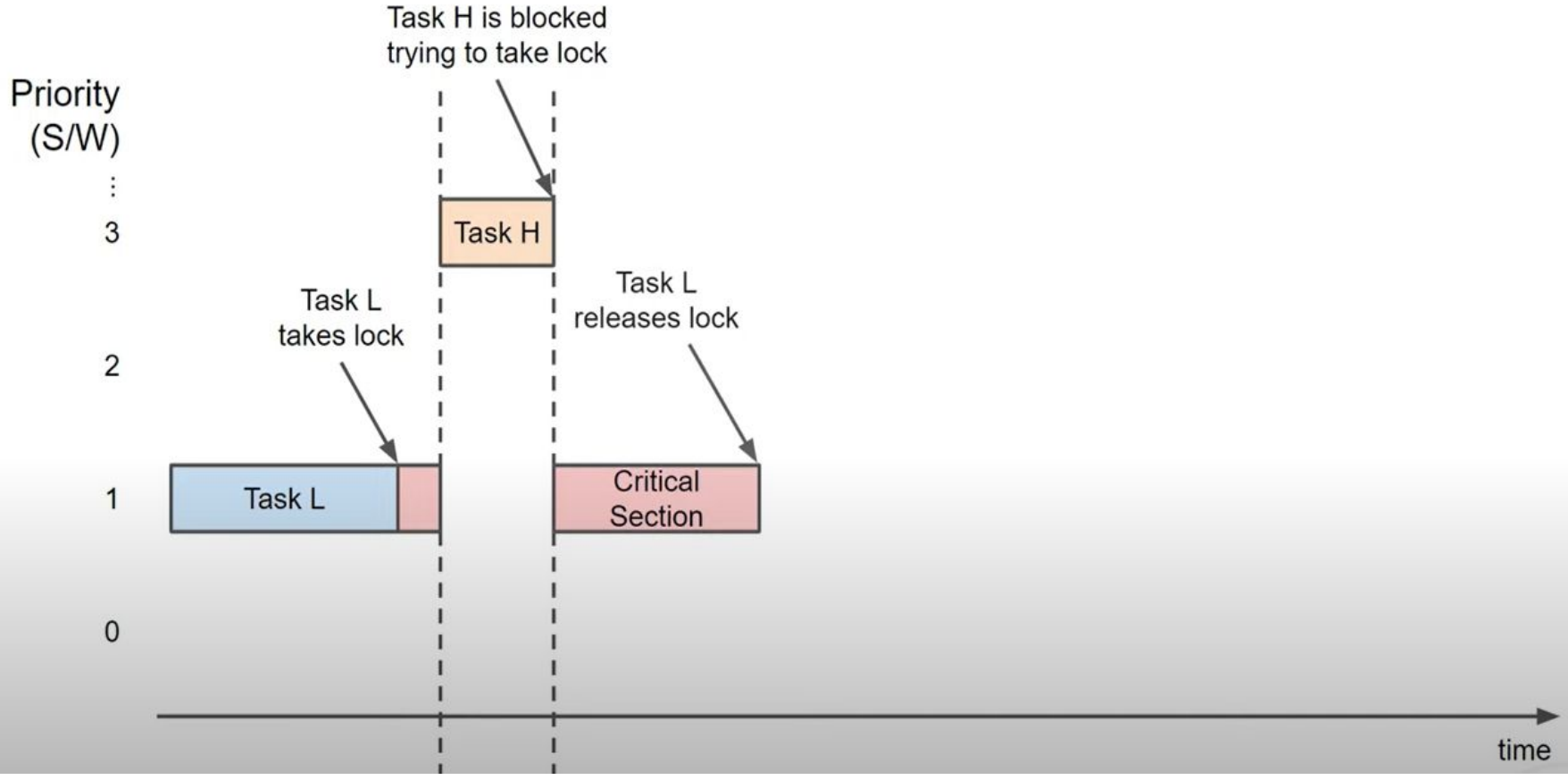
Few Points

- A higher priority job can interrupt/preempt lower priority job, AT ANY POINT (even if the lower priority job is in critical section)
- A higher priority job MAY or MAY NOT have critical section
- (And Again) If a job J1 acquires a resource, no other job (not even higher priority ones) can get the same resource before J1 releases it

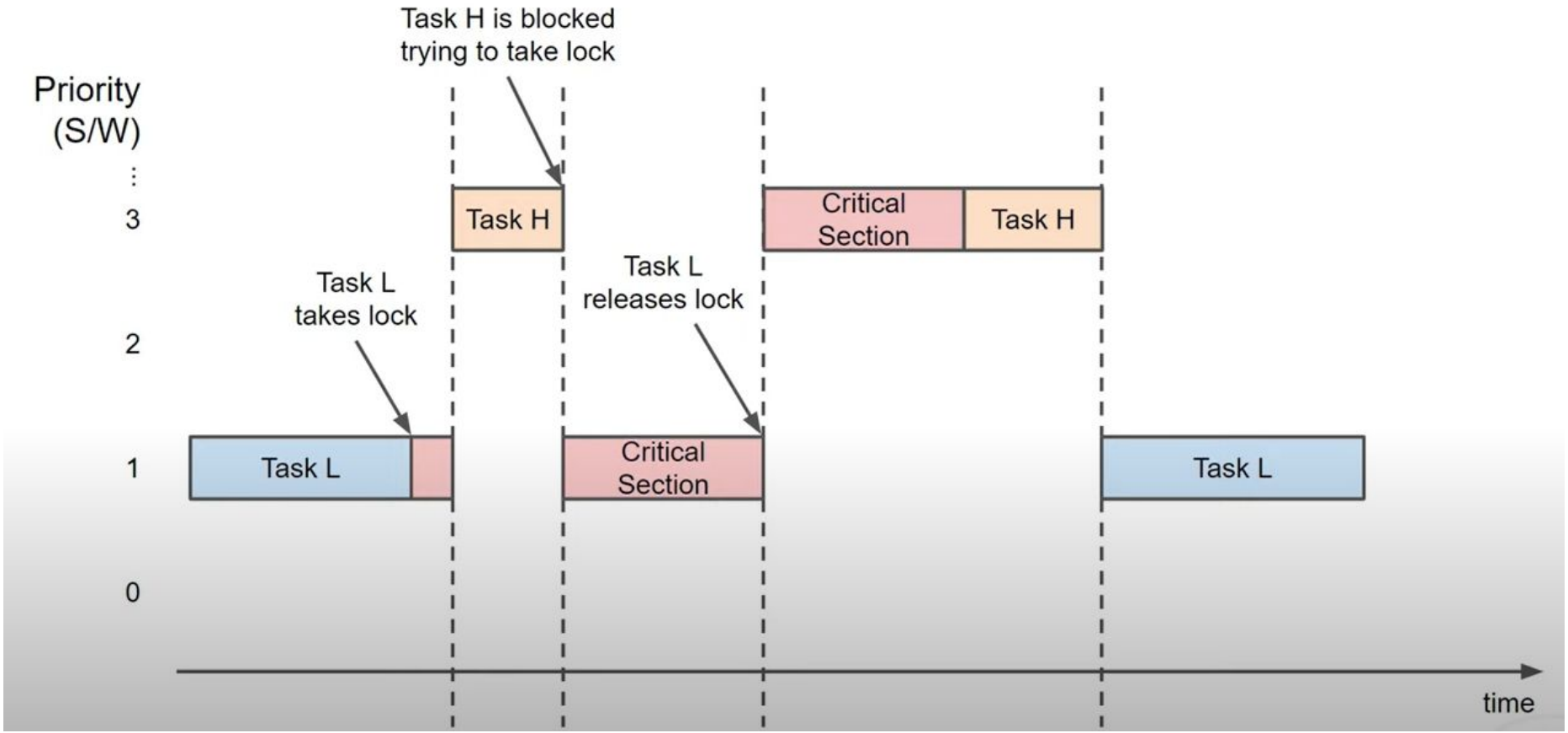
Bounded Priority Inversion



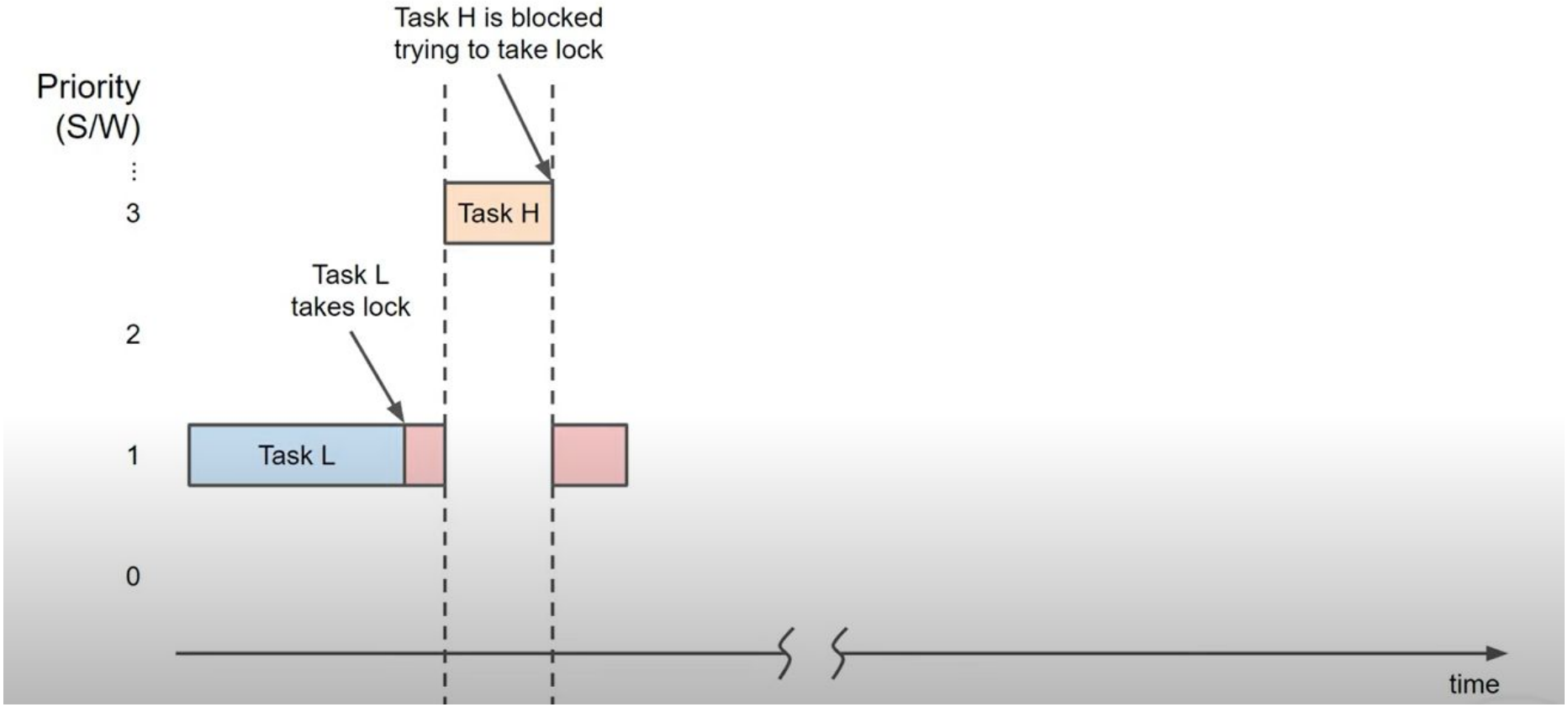
Bounded Priority Inversion



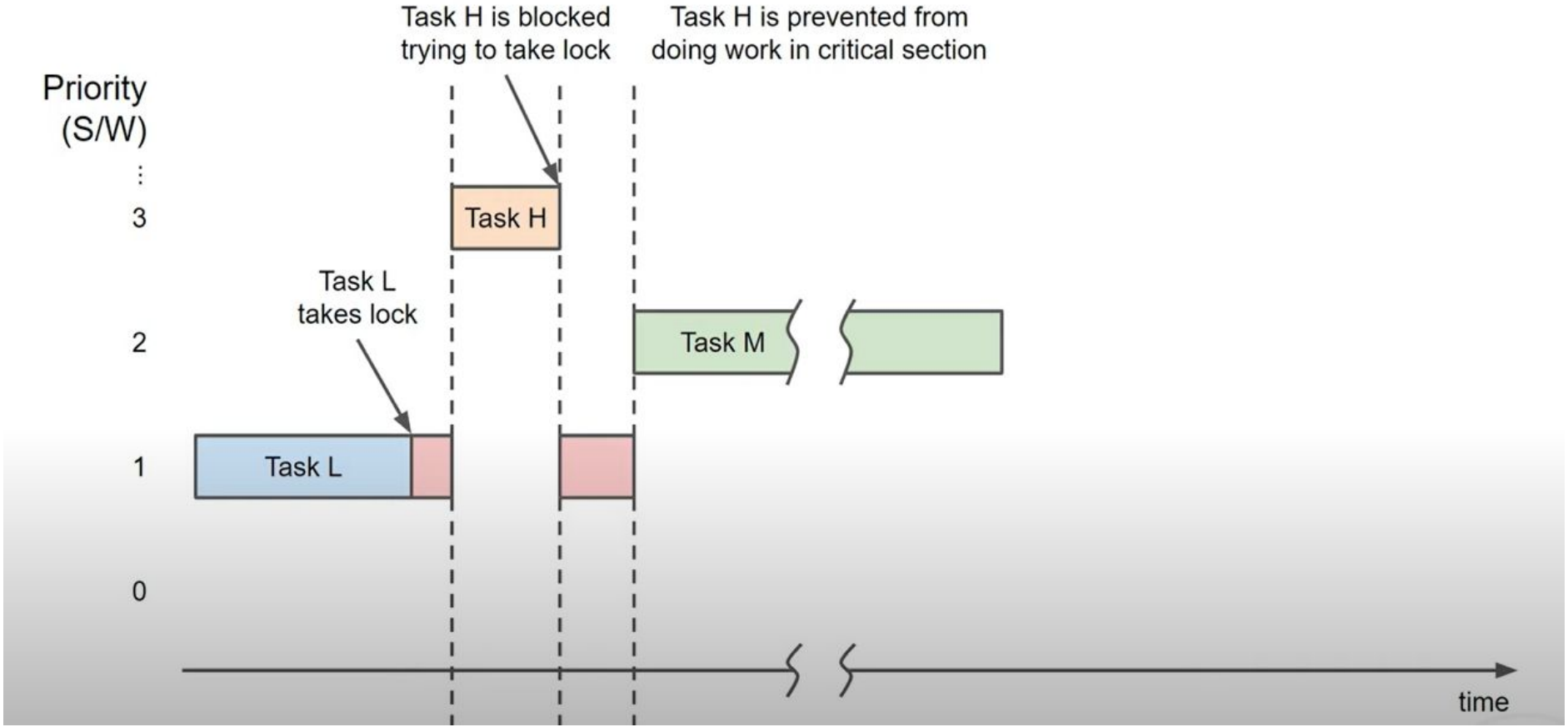
Bounded Priority Inversion



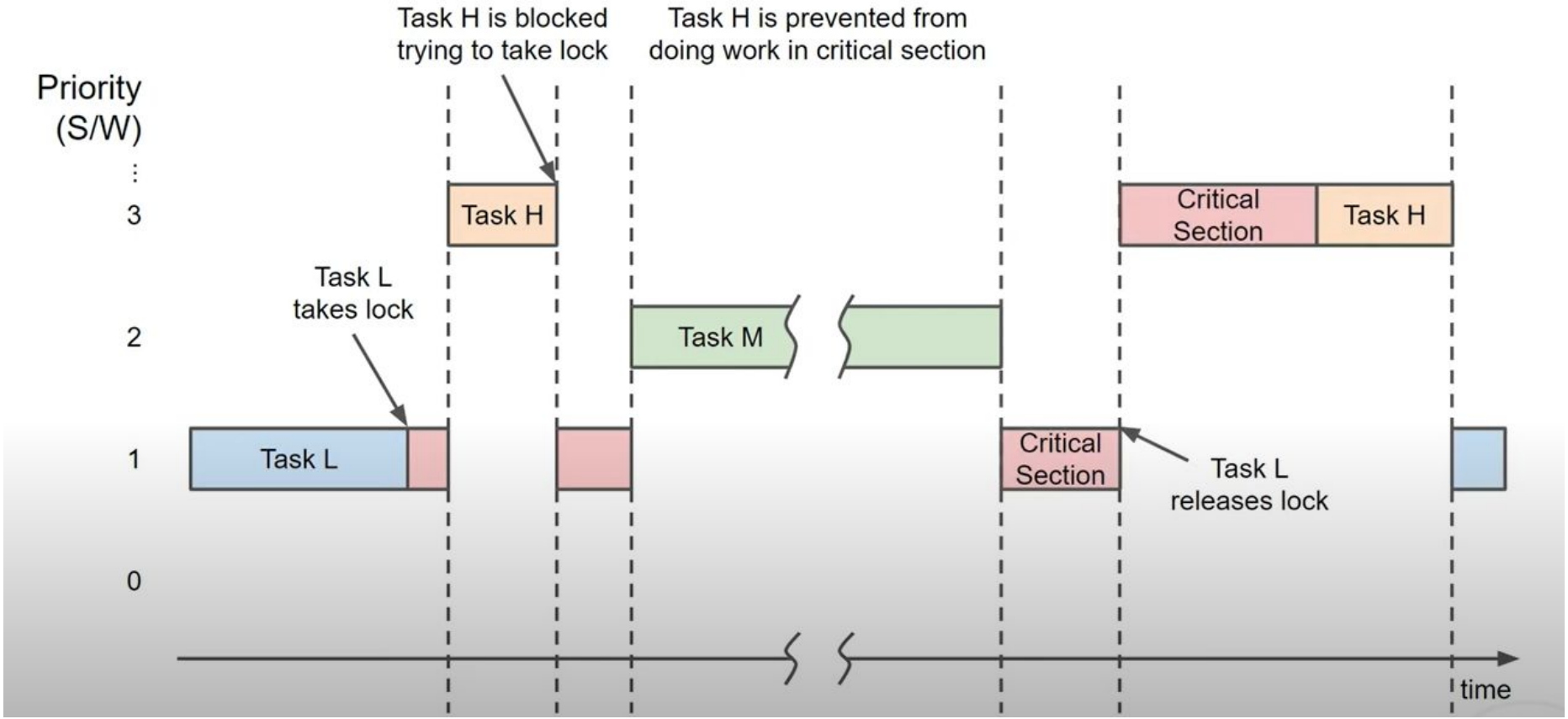
Unbounded Priority Inversion



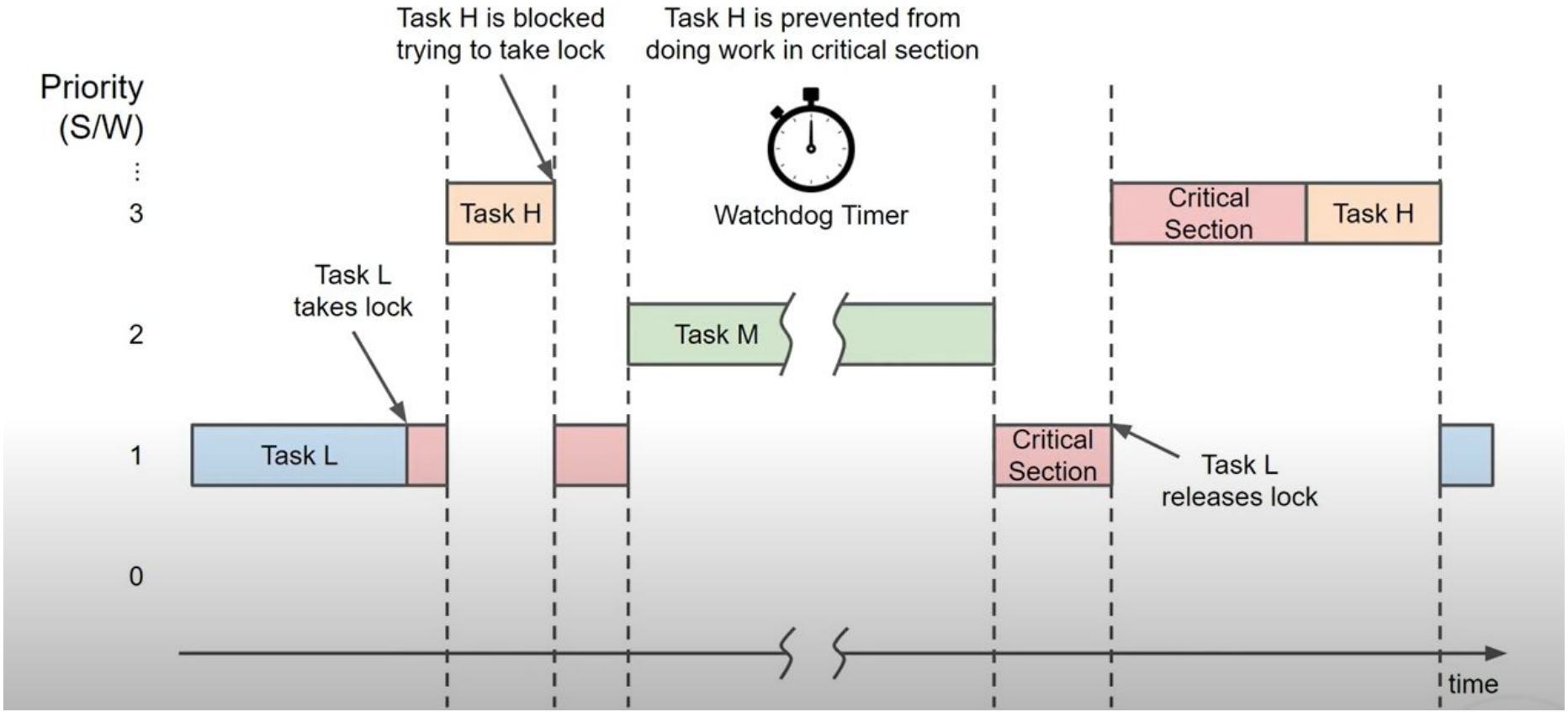
Unbounded Priority Inversion



Unbounded Priority Inversion



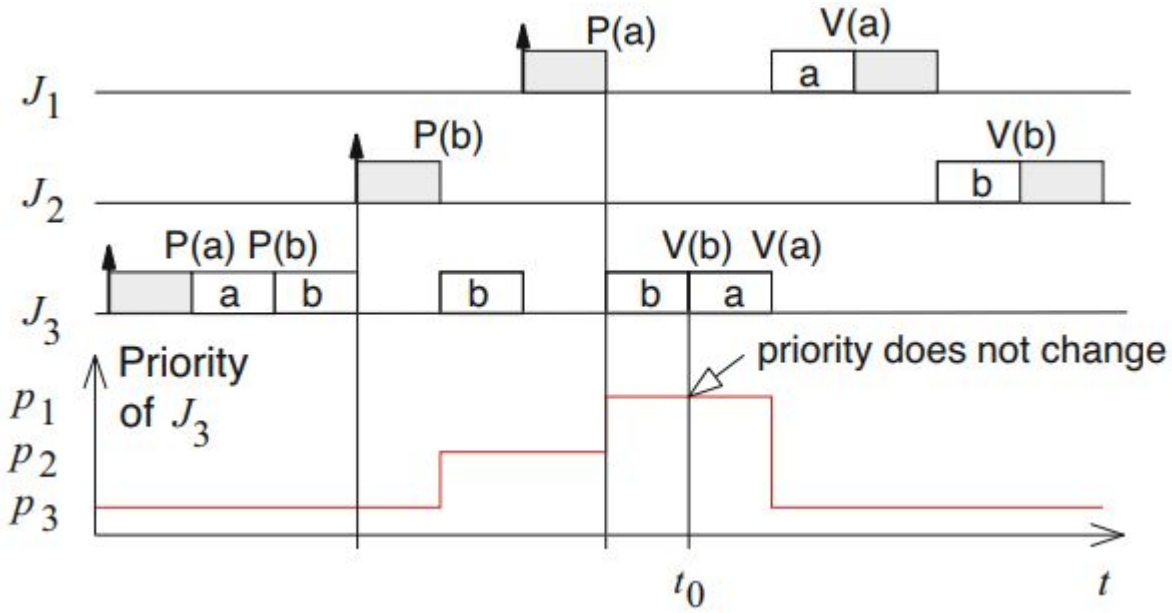
Unbounded Priority Inversion



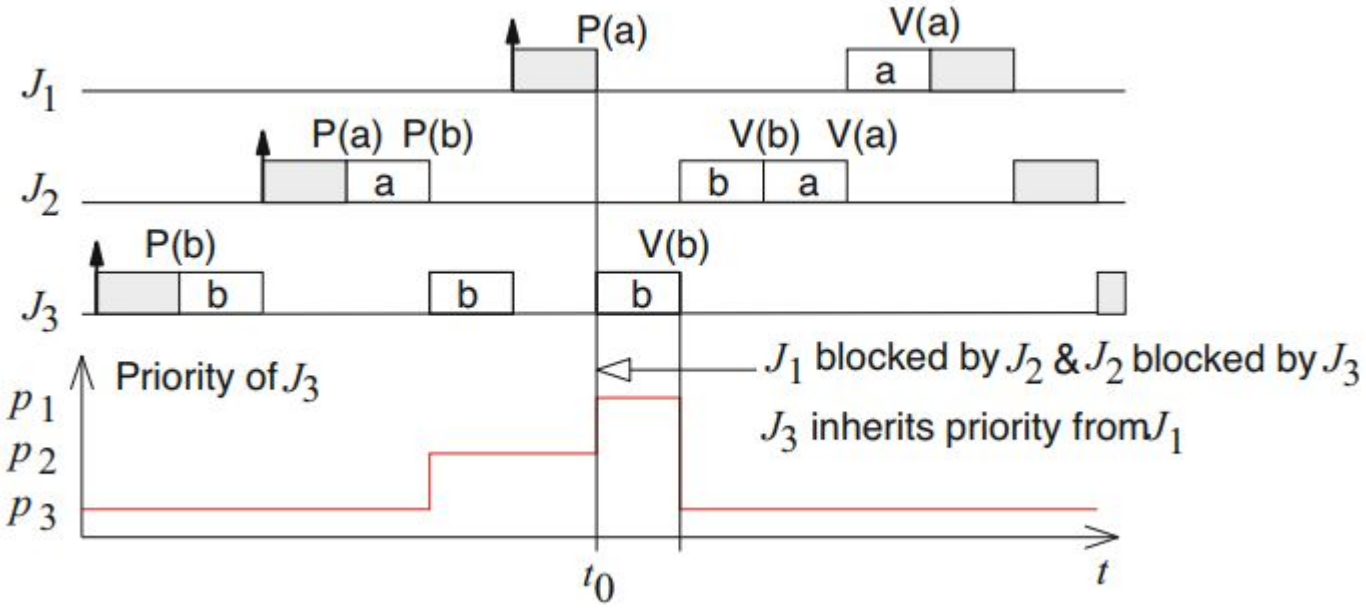
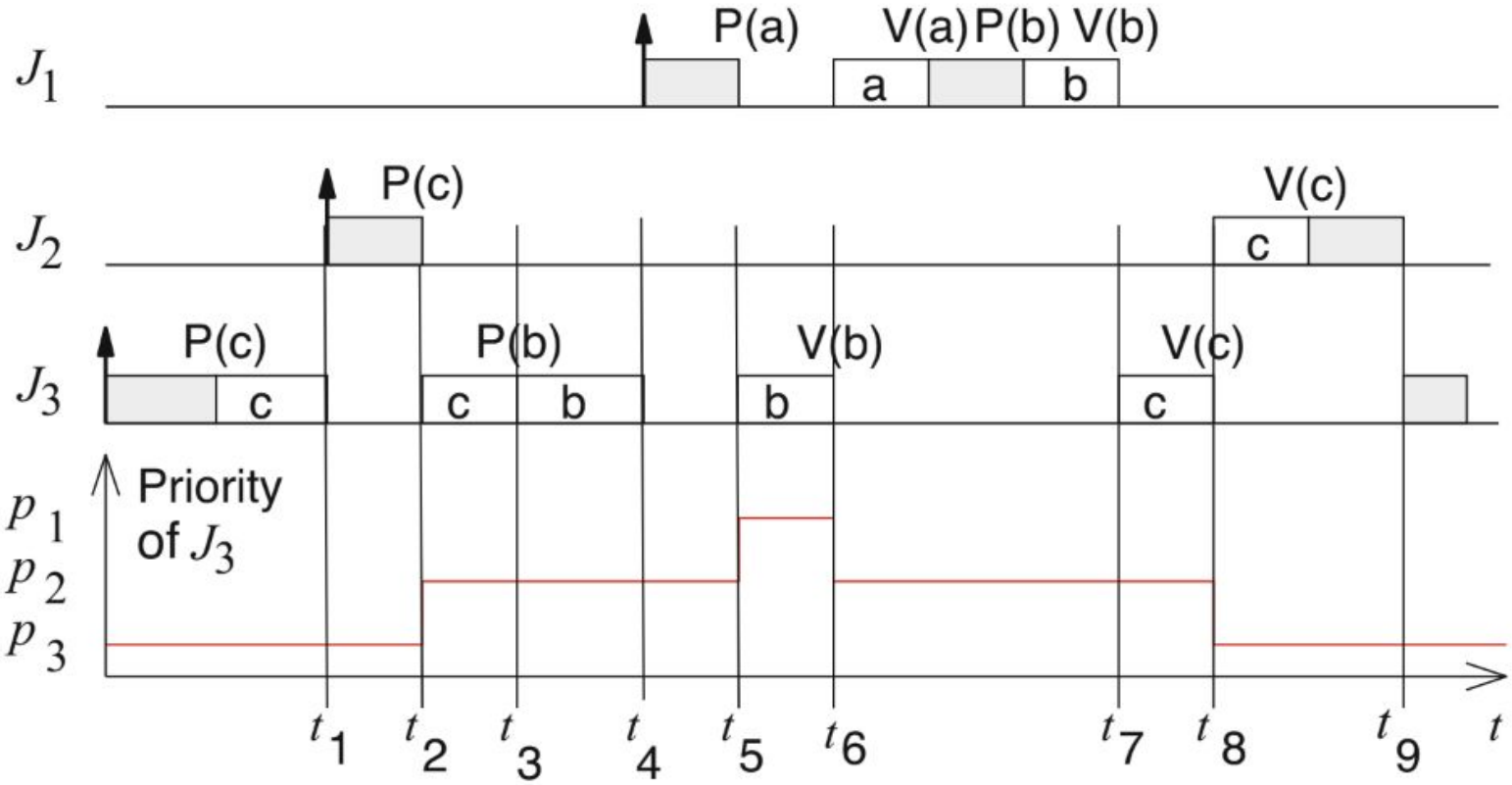
Solutions:

1. Priority Inheritance
2. Priority Ceiling

Priority Inheritance - Example 1



Priority Inheritance - Example 2



Priority Ceiling - Example 1