Dijkstra’s K state Distributed Self-Stabilizing Algorithm

- Uni-directional ring network
- n = number of processes(nodes)
- Each process states(Si) for given process Pi holds an integer value which can be from 0 to k where k=n
- Every process knows the state of its left neighbor
- Two types of process
  - Bottom
  - Other

Notion of privilege

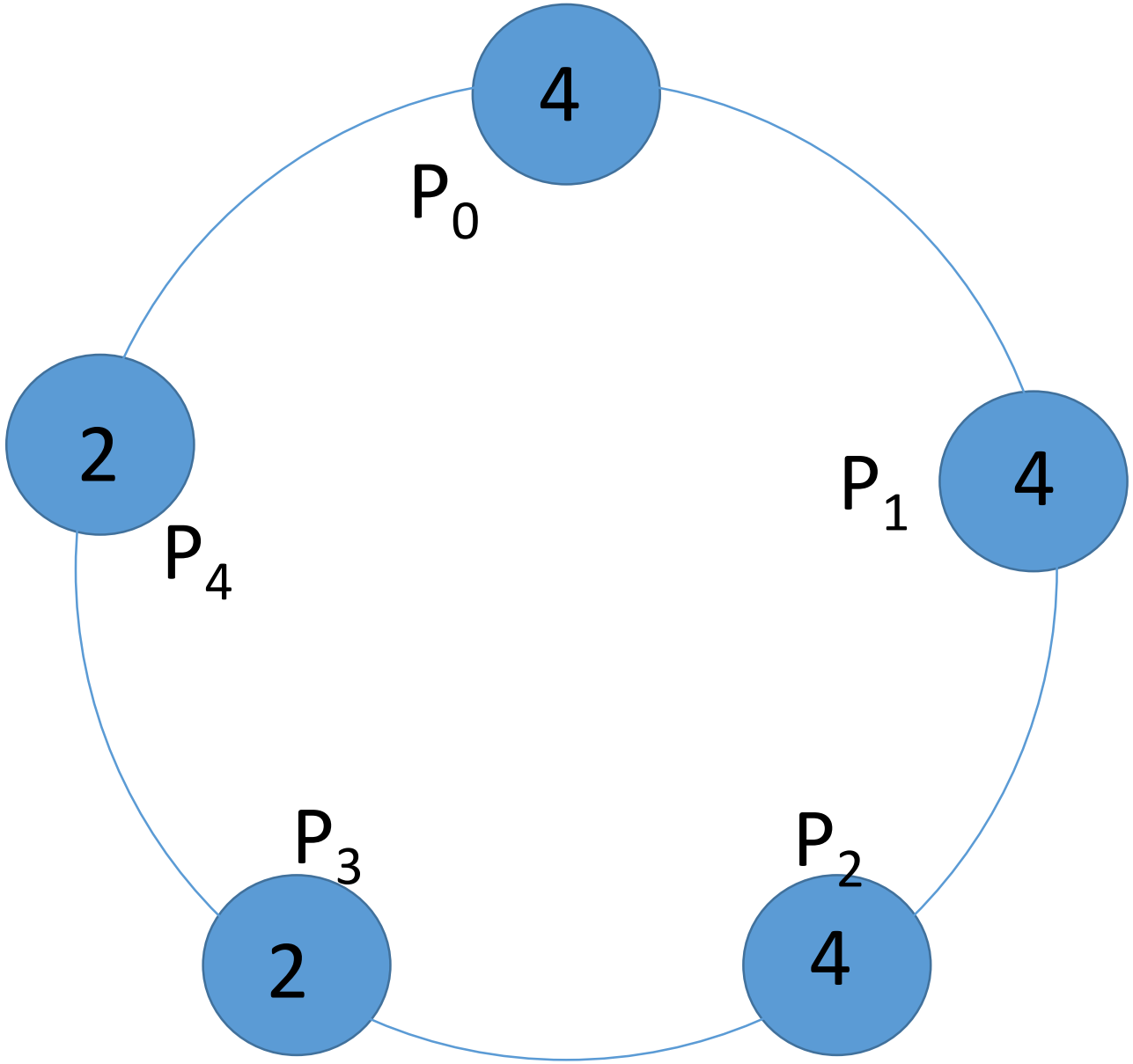
- When a process has the privilege, it is authorized to make a move
  - Change its local state, and enter the critical section
- The system satisfies following properties
  - There must be at least one privilege in the system
  - During an infinite time, every process should be able to receive a privilege infinitely many times.

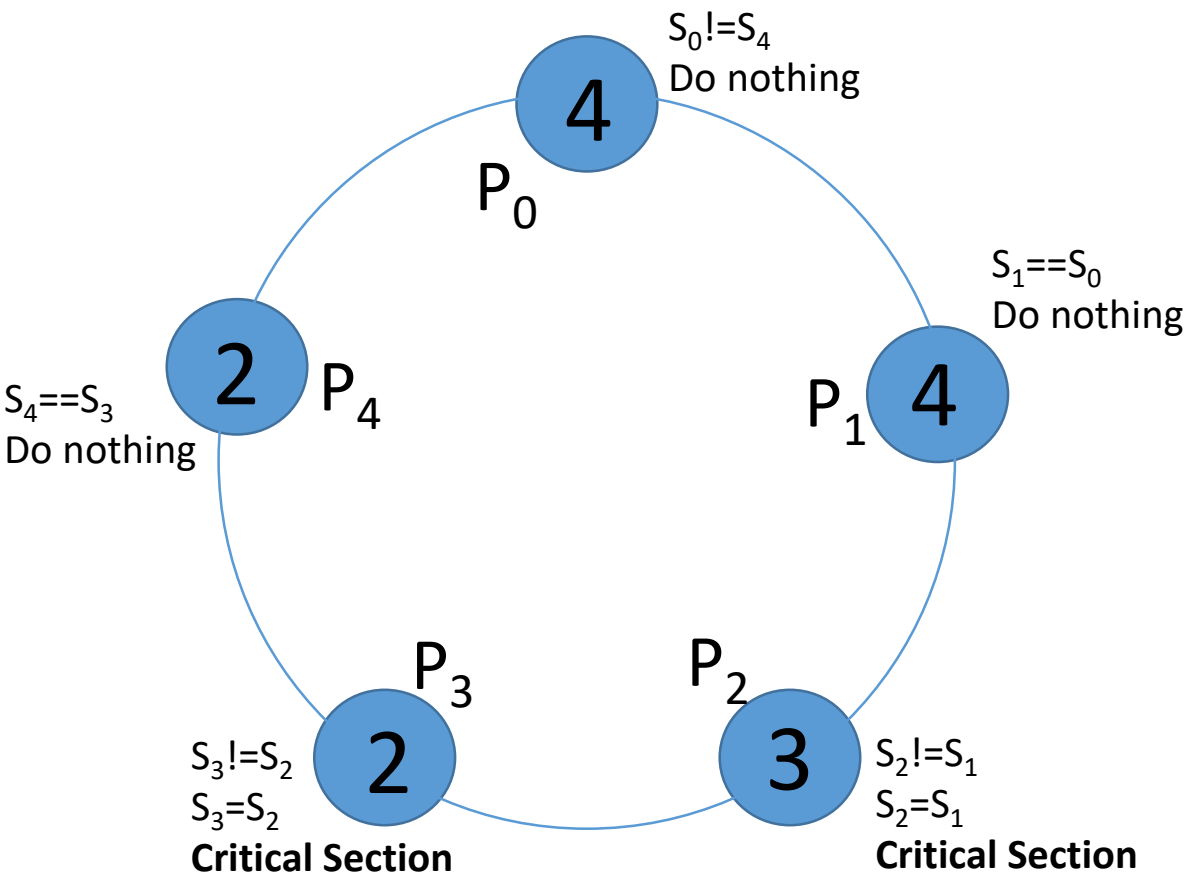
Bottom Process(P_0)

- Send value to right neighbor (S_0)
- Receive left neighbor value(S_{n-1})
- If(S_0==S_{n-1}){
  - //Critical section
  - S_0=(S_0+1) mod k
  - }
- Else
  - Do nothing

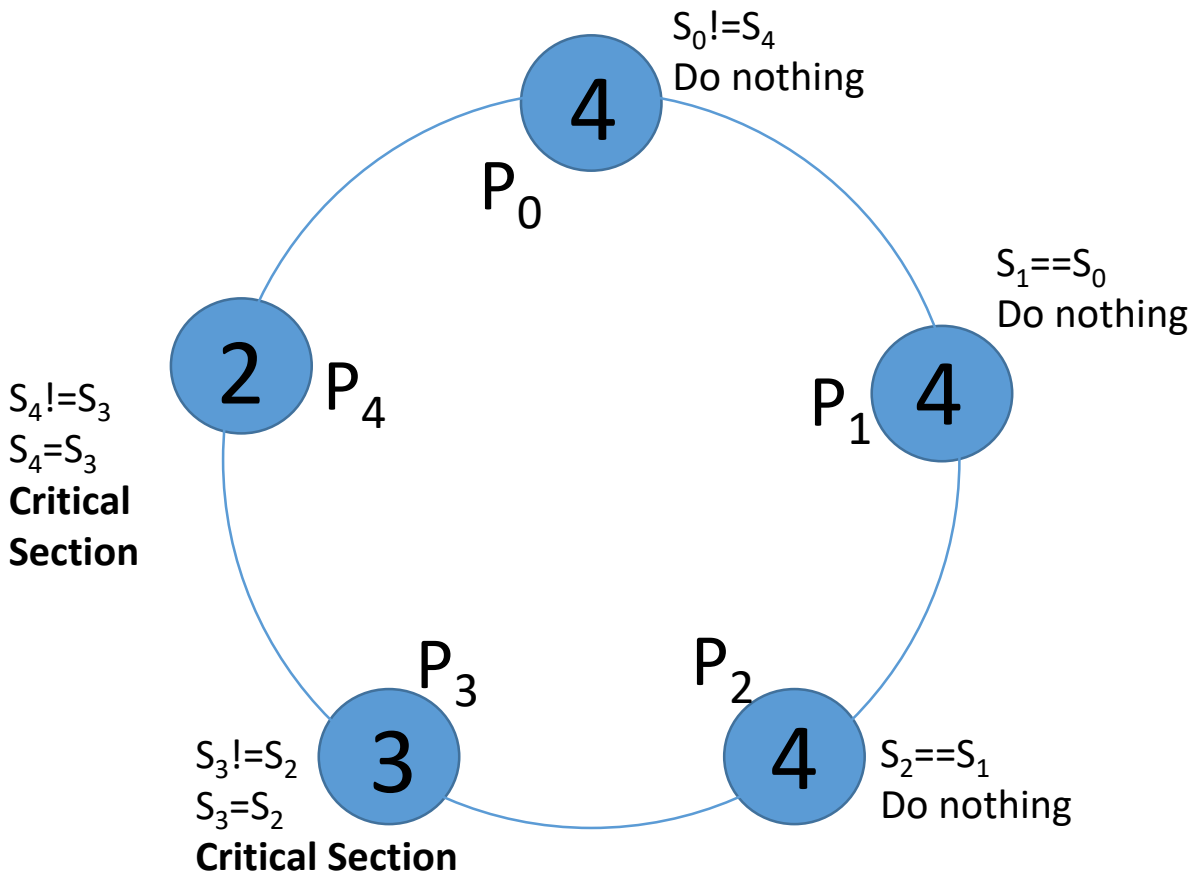
Other Processes (P_i)

- Send value to the right neighbor(S_i)
- Receive left neighbor value(S_{i-1})
- If(S_i != S_{i-1}){
  - //In critical section
  - S_i=S_{i-1}
  - }
- Else
  - Do nothing


4
P0
2
P4
P1
4
P3
2
P2
4



Round 1



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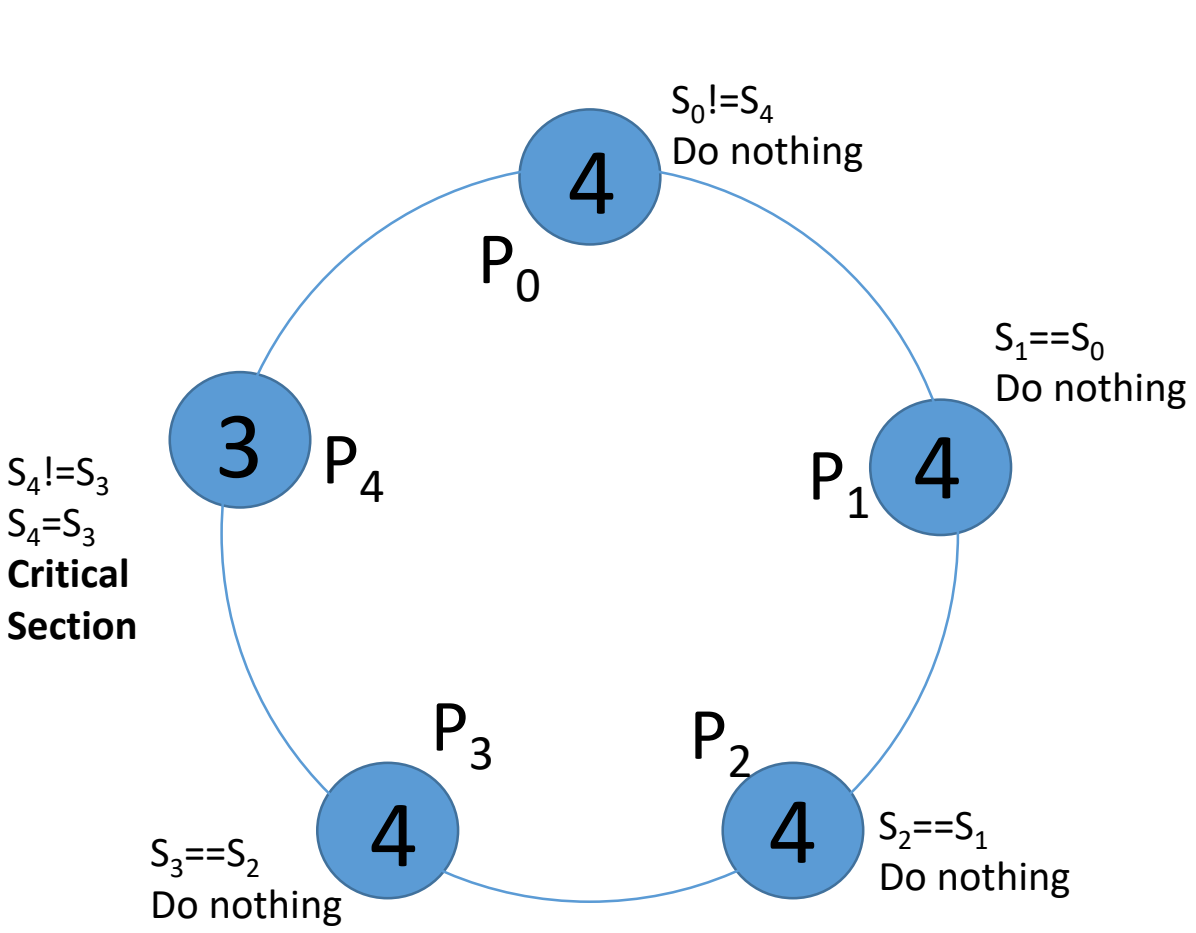
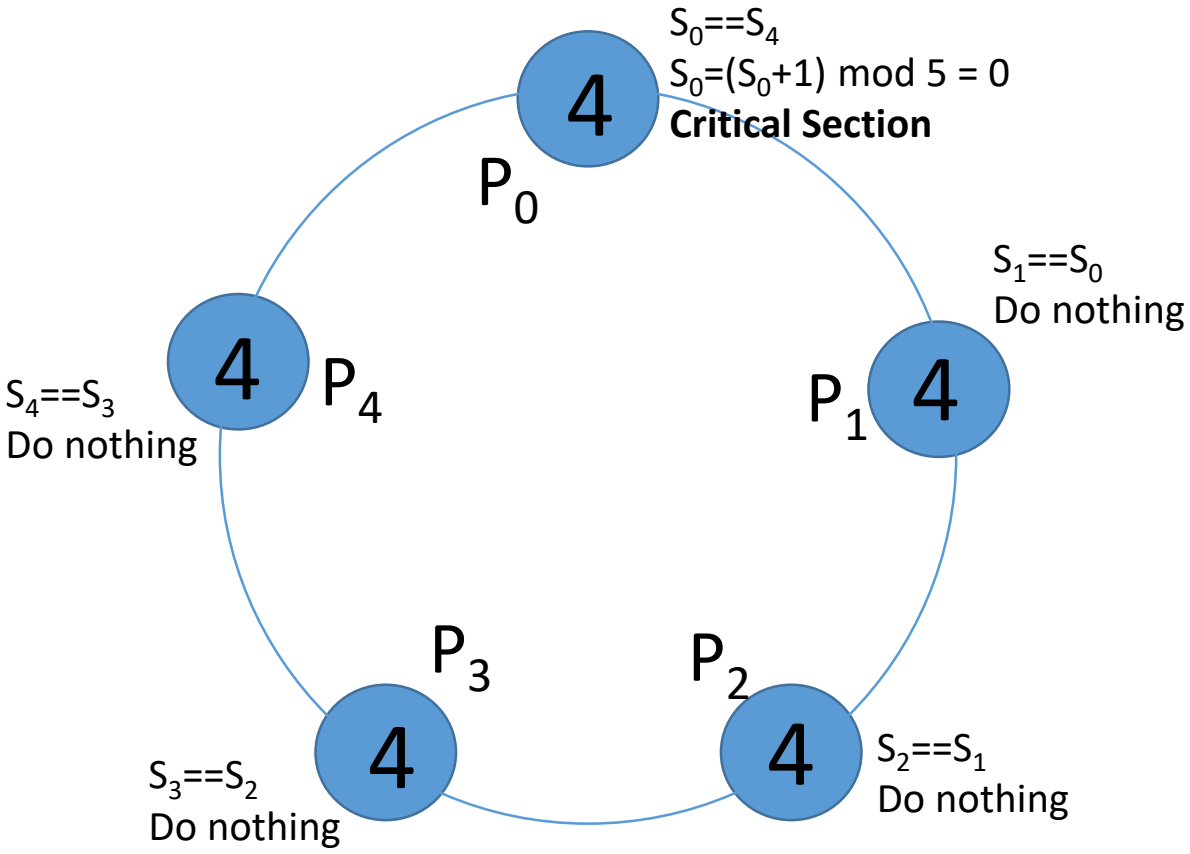


Round 3



Round 4

And so on