Leader Election in DS

topology (n PEs)

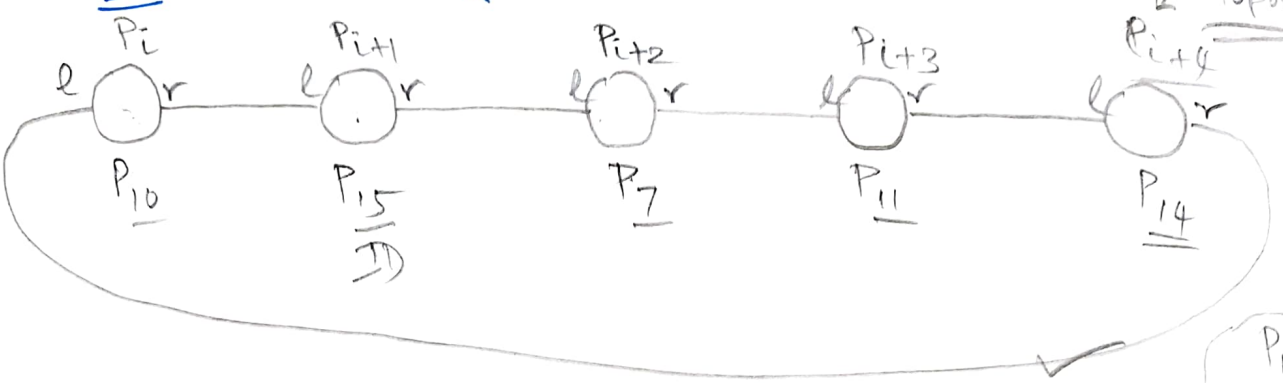
24 Feb 2022
11-12 PM

↳ How do we elect a leader?

Processes : n

Resources : m_k

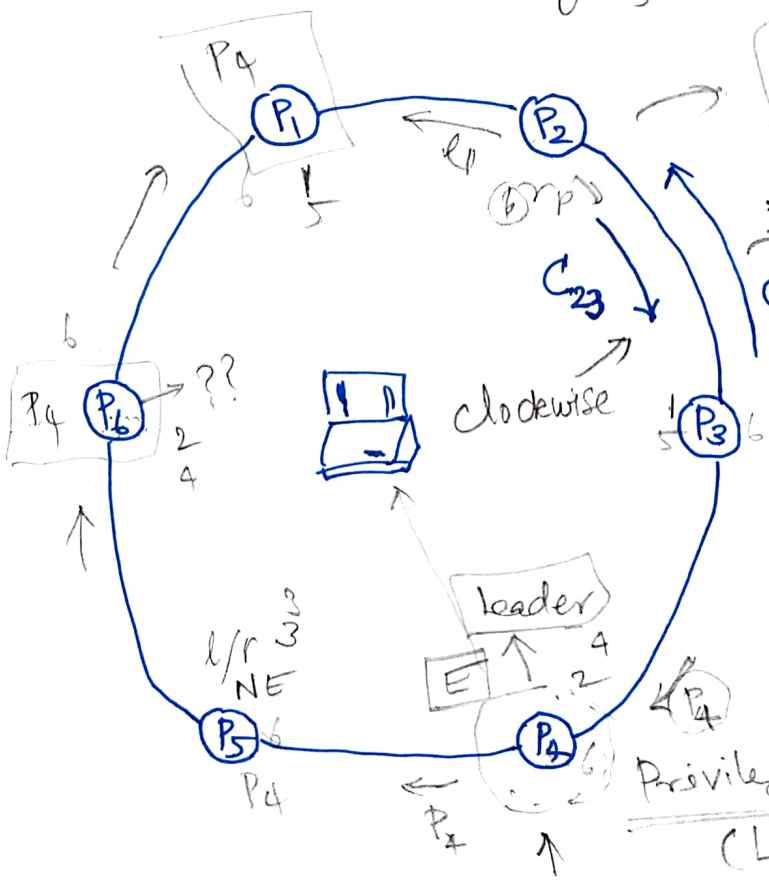
define formally Topology



$deg(P_j) = 2.$ $P_{i-1} \leftarrow P_i \rightarrow P_{i+1}$

$P_1 \rightarrow P_n$

$P_{i-1} \Leftrightarrow P_i \Leftrightarrow P_{i+1}$



n = 6

→ anti clockwise

$C_{23} \neq C_{32}$.

Direction:

* unidirectional
* bidirectional

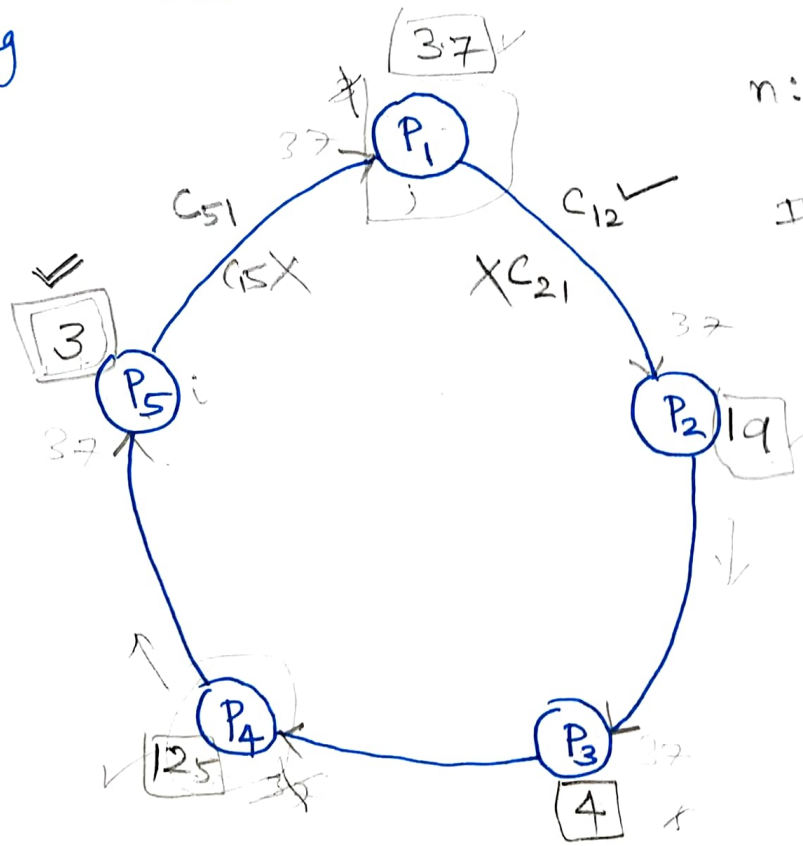
$LC(P_4) > LC(P_6)$ ⇒ logical clocks

Properties:

* SAFETY:
  → never elect more than one Leader

* LIVENESS:
  → eventually elect at least one leader

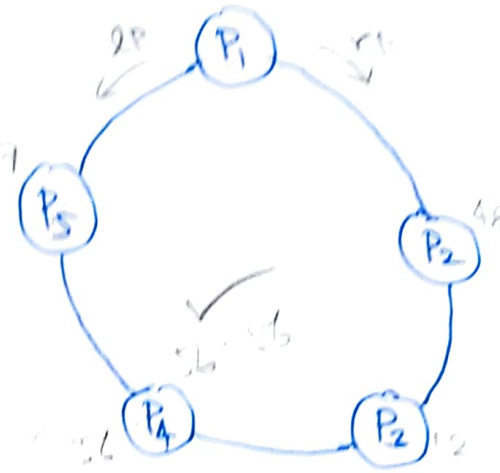
LCR Algo → Robert, 1979
LeLann Chang



n: 1, 2, ..., n
0, 1, ..., n-1
IDs: 3, 37, 19, 4, 25
↳ clockwise

Assumptions:
→ directed ring
C_{ij} → Sending
P_{ji} → receive

* Candidate with the largest ID gets elected.
* Time: O(n) — n send / n receive event
* #messages: 1st largest ID: (n msgs) — 2n events.
  2nd largest ID: (n-1)
  : (n-2)
  : (n-3) .... 1 ⇒ $\Theta(n^2)$

O(n log n) LE Algo:

→ Each P_i