#ASLI ENGINEERING

# LCR Algorithm for Leader Election

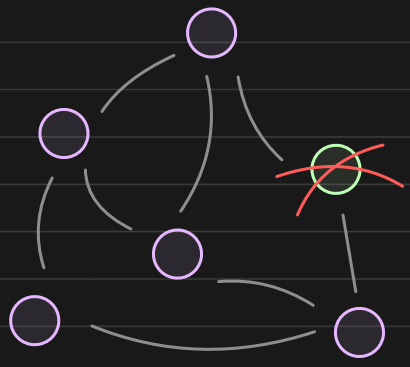
SWIPE

BY

ARPIT BHAYANI

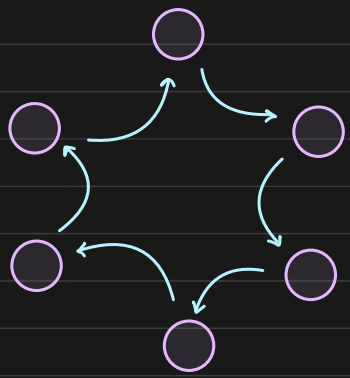
# LCR algorithm for leader Election

leader Election is an automated way of System Recovery, when the leader node is down, the leader Election algorithm is triggered which elects the new leader thus restoring the system



The LCR algorithm (and Synchronous)

LCR is one of the simplest leader Election algorithm. It works with any network which is topologically arranged in a unidirectional ring. [bare minimum]

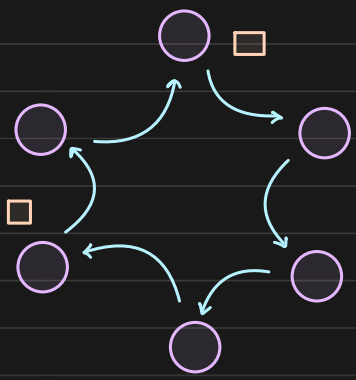


Algorithm works even when the total number of nodes are unknown

Assumptions:

- every node has a unique UID
- UIDs are comparable
- every node knows its immediate clockwise neighbour

## The algorithm



Every node participates in the election and pitches itself to be the new leader.

Pitch: create a message with its own UID and send it to its neighbour.

When a node receives a UID, it compares the incoming UID with its own UID

if incoming UID > own UID: forwards UID to its neighbour

if incoming UID < own UID: discard the incoming UID

if incoming UID == own UID: declares itself as the leader

Because every single node participates, the message by the node with the largest UID will survive and will eventually reach the node from where it started. The node will thus know it has the largest UID and hence the new leader

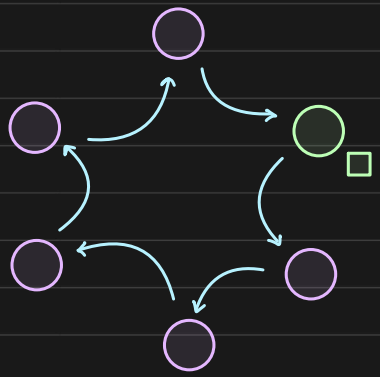
The new leader is then announced through another message passed across the topology.

## Halting the algorithm

There is no way for a node to automatically stop, as it would not know if everyone completed their pitching. (total node count could be unknown)
Only the new leader would know that it is the new leader and hence it initiates the HALT

The new leader initiates a message having

1. the new leader information
2. notification to stop / halt the election



When a node receives this "report" msg,

- halts the election process
- stores the new leader information locally
- forwards the message to the next node

## Complexity

Since each node pitches itself and the message may make entire trip, the worst case of communication complexity (#messages) is $O(n^2)$
where n: number of nodes in the network