Distributed Systems

a.y. 2023/2024

Distributed Systems:

Election

Leader election algorithms

- The problem
  - N processes, may or may not have unique ids (UIDs)
  - for simplicity assume no crashes
  - they must choose unique master co-ordinator amongst them
  - election called after failure has occurred
  - one or more processes can call election simultaneously

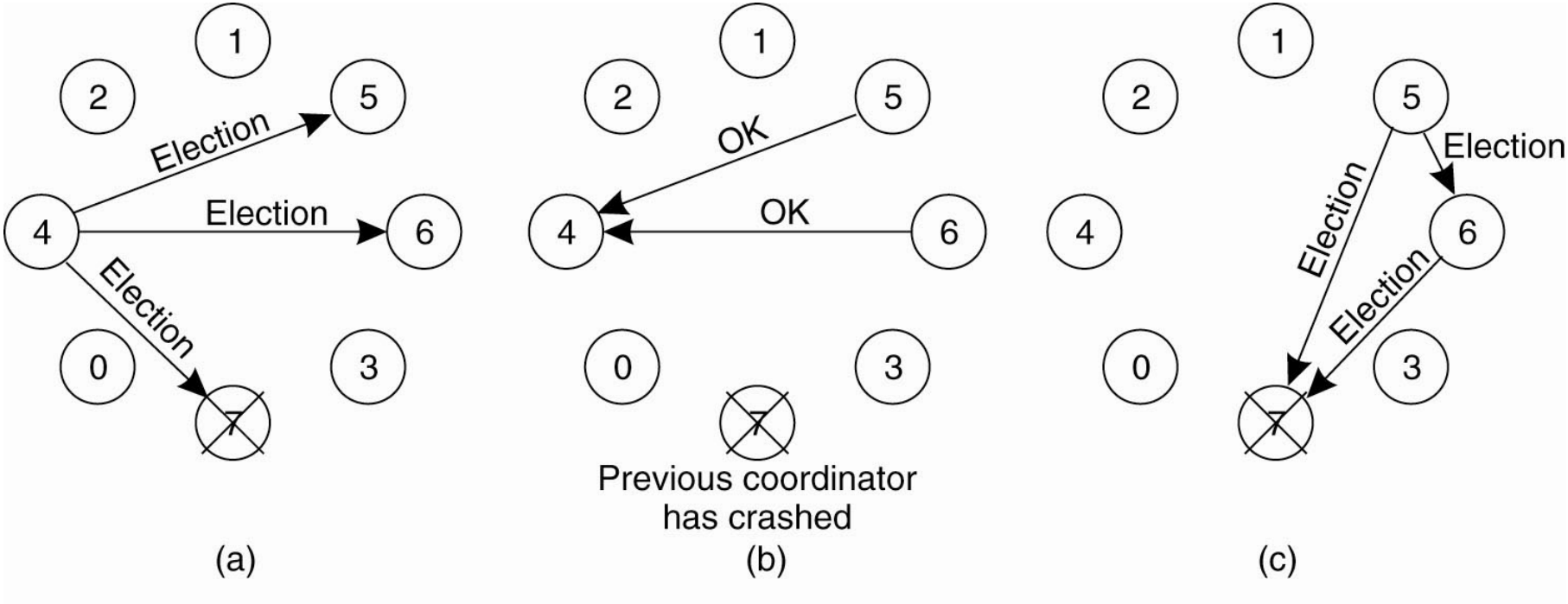
- (**LE1**) Every process knows P, identity of leader, where P is unique process id (usually maximum) or is yet undefined.
- (**LE2**) All processes participate and eventually discover the identity of the leader (it cannot be undefined).

Election Algorithms

- The Bully Algorithm

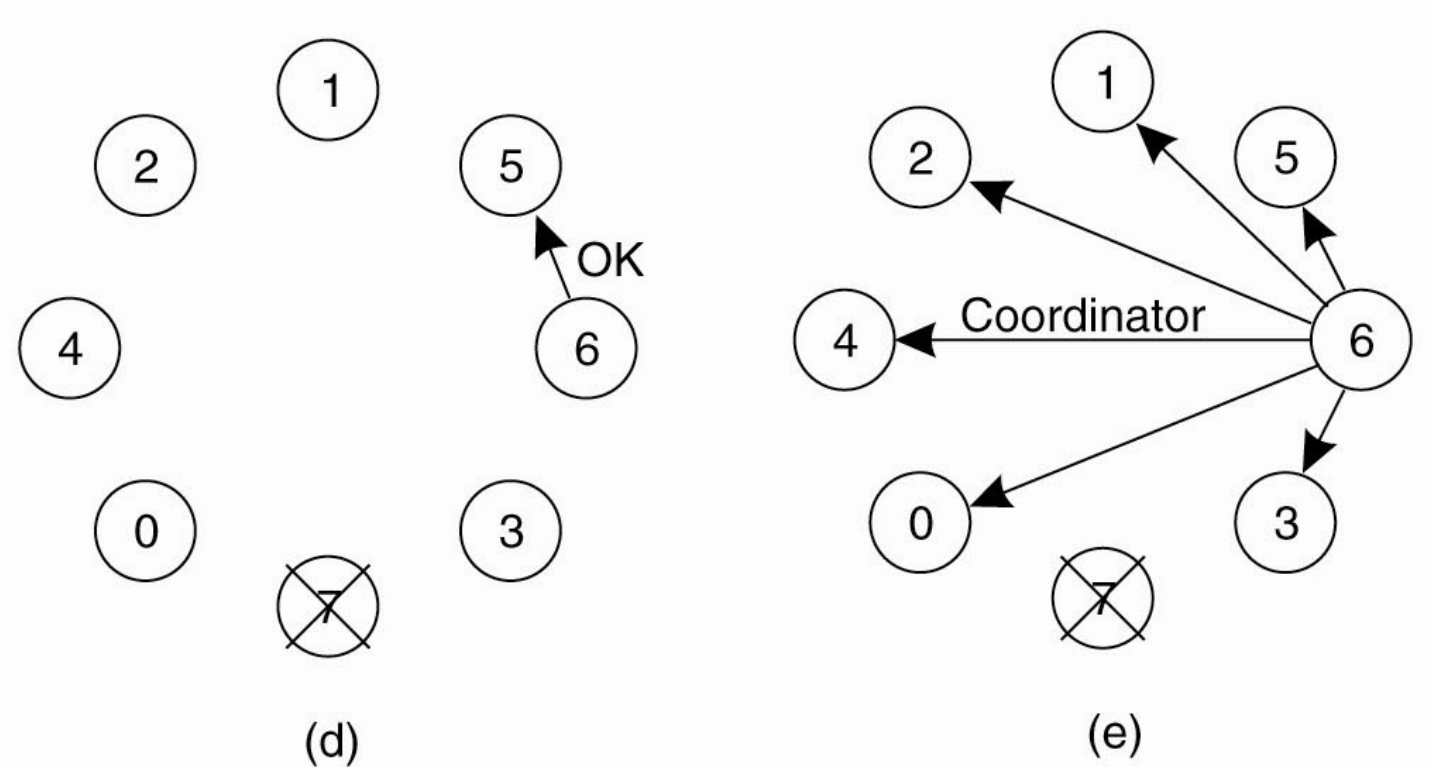
1. *P* sends an *ELECTION* message to all processes with higher numbers.
2. If no one responds, *P* wins the election and becomes coordinator.
3. If one of the higher-ups answers, it takes over. *P*'s job is done.

The Bully Algorithm



- (a) Process 4 holds an election.
- (b) Processes 5 and 6 respond, telling 4 to stop.
- (c) Now 5 and 6 each hold an election.

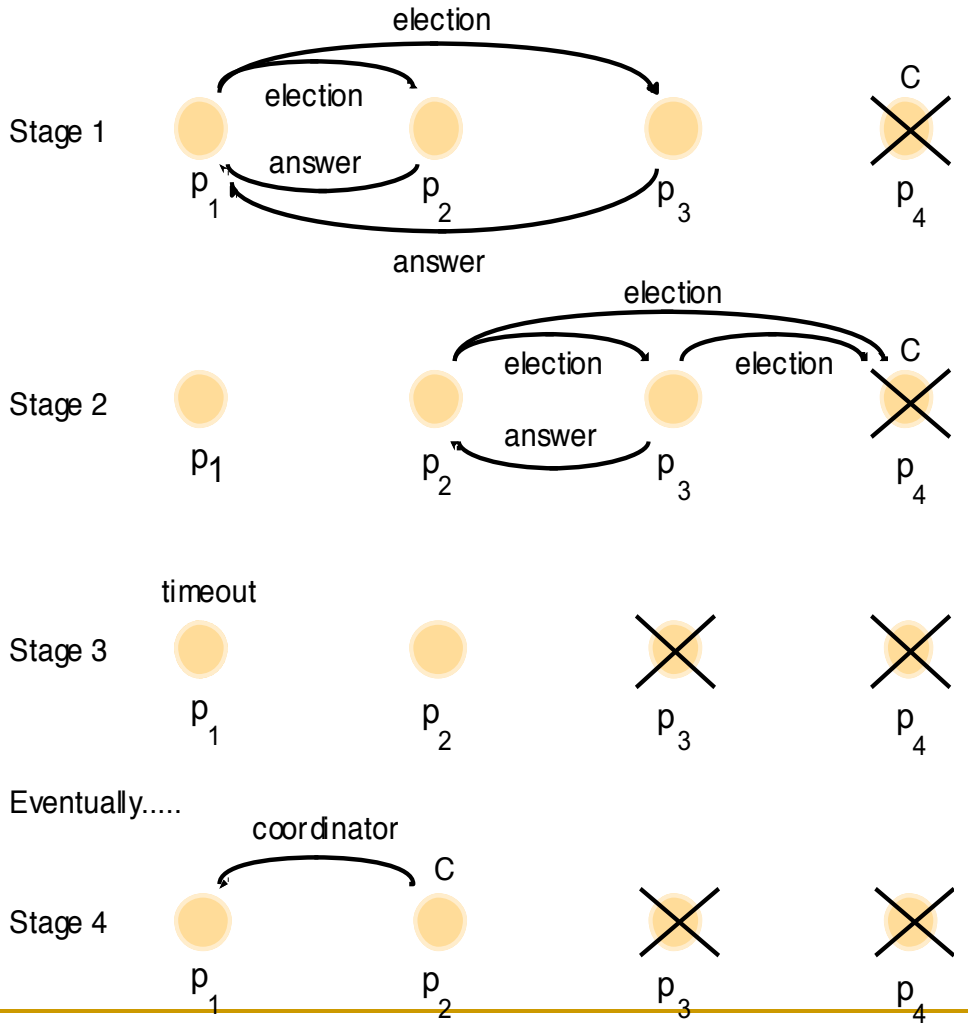
The Bully Algorithm



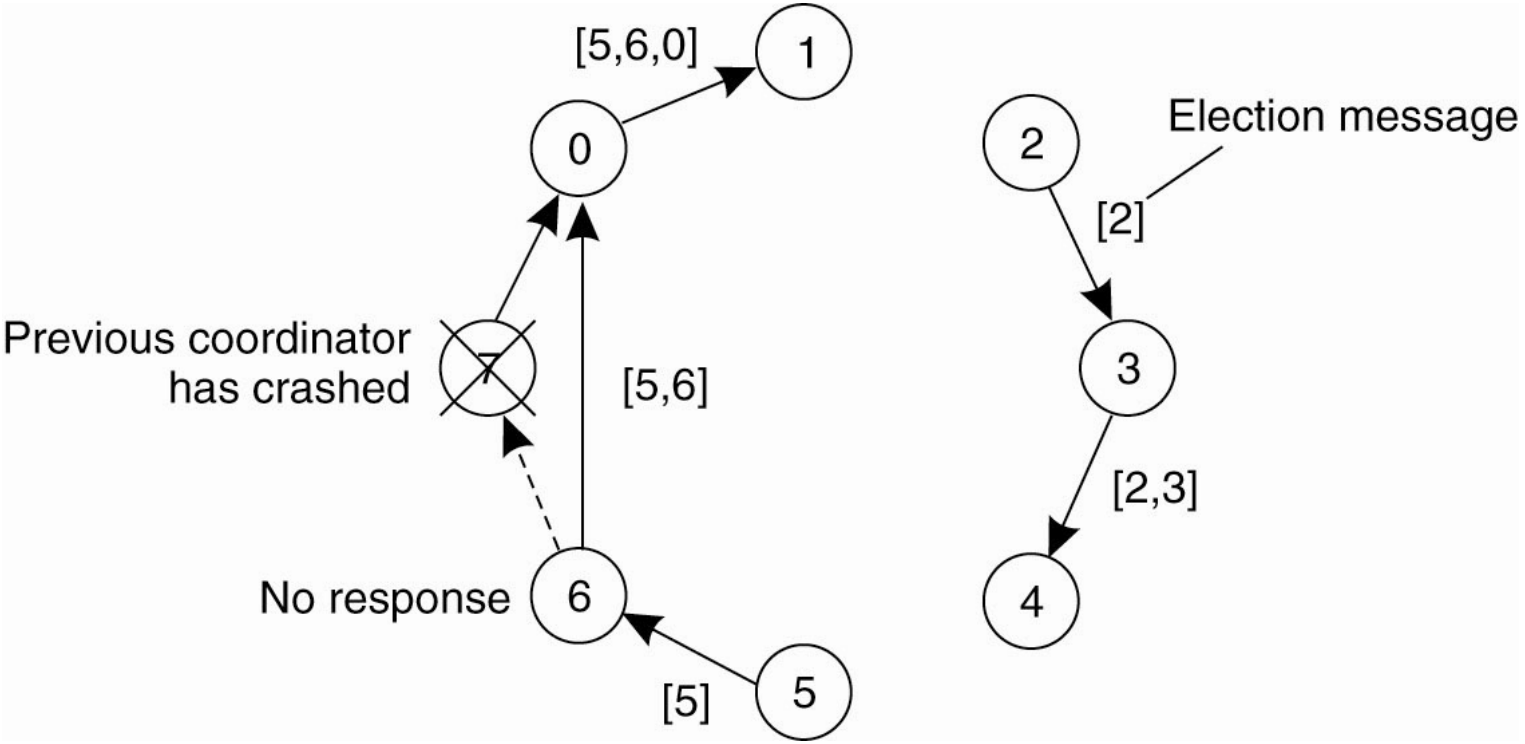
- (d) Process 6 tells 5 to stop.
- (e) Process 6 wins and tells everyone.

the bully algorithm

The election of coordinator p_2, after the failure of p_4 and then p_3



A Ring Algorithm



Leader election algorithms

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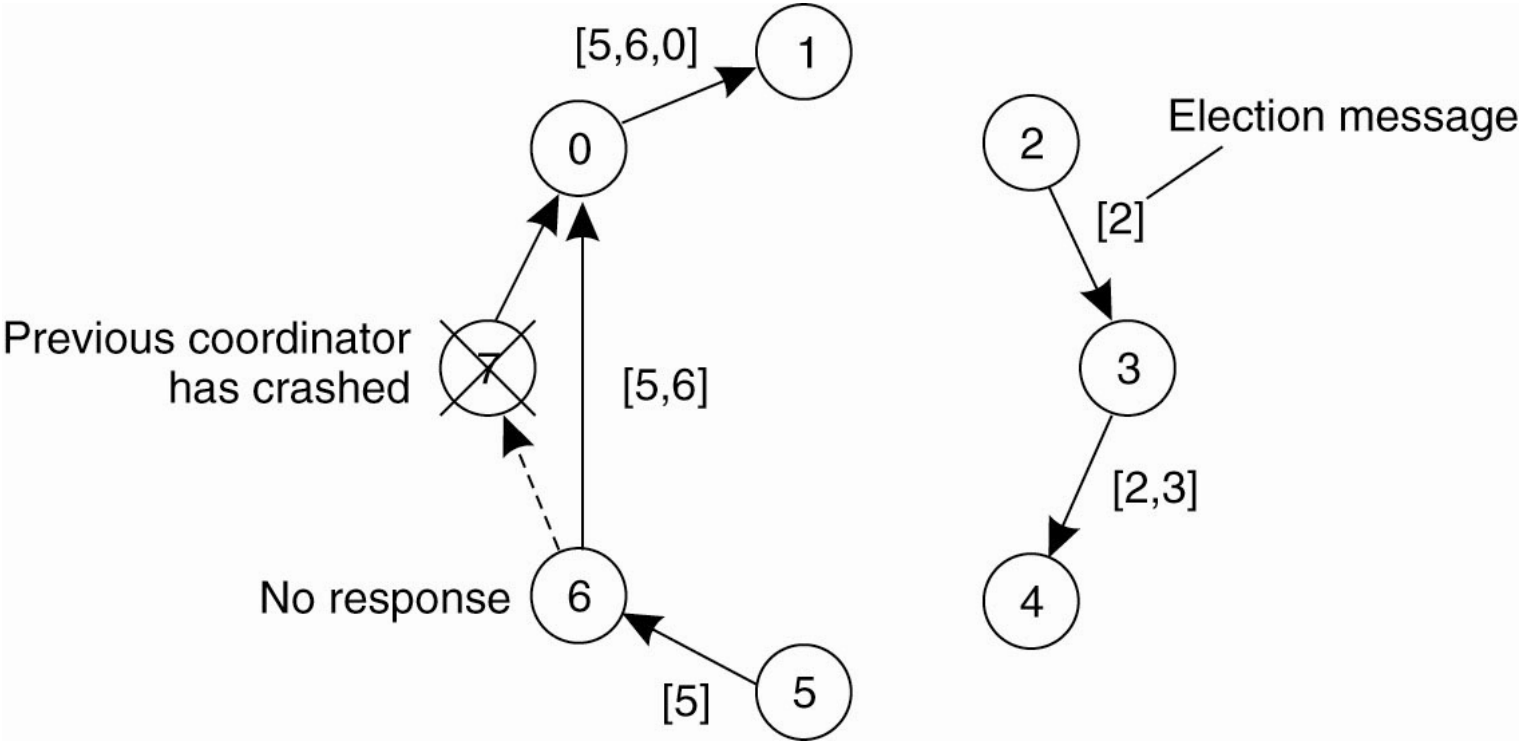
A Ring Algorithm



…Distributed Systems…

End of lecture