



# Election Algorithms

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# Summary

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- Problem definition
- Bully algorithm
- Ring algorithm

# The problem

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- Discover a coordinator among a group of similar processes, in charge for a generic service
- Assumptions
  - ▶ Each process has a unique id (i.e. machine # if only one P per node)
  - ▶ Each process knows the id of the others
  - ▶ The processes are unaware of the running/fault state of the others
- Election
  - ▶ Goal: ensure that the election achieves an agreement among all the processes (about the new coordinator)
  - ▶ Typ. the P with the highest id is elected

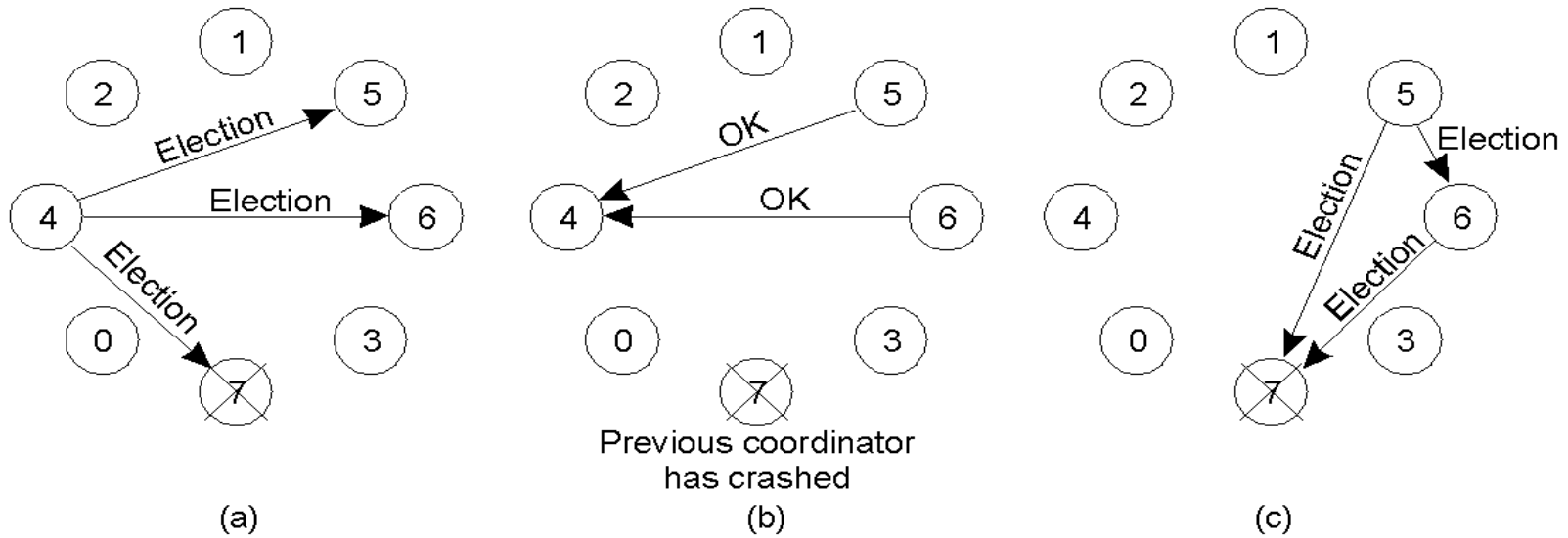
# Bully algorithm

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- A P suspecting the missing of a coordinator, can start an election
  - ▶ P sends an ELECTION msg to all the P with higher ids
    - If no one answer, P is the winner and becomes the coordinator
    - If a P with a bigger id answers, P loses
  - ▶ If a P receives msg from those having smaller id, an answer is sent to block the processes
- Finally only a P (the new coordinator) will remain and it will inform the other by sending a msg
- If a process wakeup or it is restarted, the first action is to trigger an election

# Bully Algorithm



- Process 4 holds an election
- Process 5 and 6 respond, telling 4 to stop
- Now 5 and 6 each hold an election

# Ring Algorithm

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- Hp: processes are physically or logically ordered, each of them knows the following in the ring
- When a P suspects a coordinator fault
  - ▶ Sends an ELECTION msg containing its Pid to the next; if it is down the msg is sent to the following of the ring
  - ▶ Each member of the network receives and propagates a msg to the next, adding its id
- When a msg return to a P who sent it (verif. by inspecting the list), the msg is turned into COORDINATOR and circulated, to report:
  - ▶ New coordinator: P of the list with highest id
  - ▶ Network members still active
- Multiple messages can circulate over the network

# Ring Algorithm

