Ring Algorithm

Group 9

CSE-A

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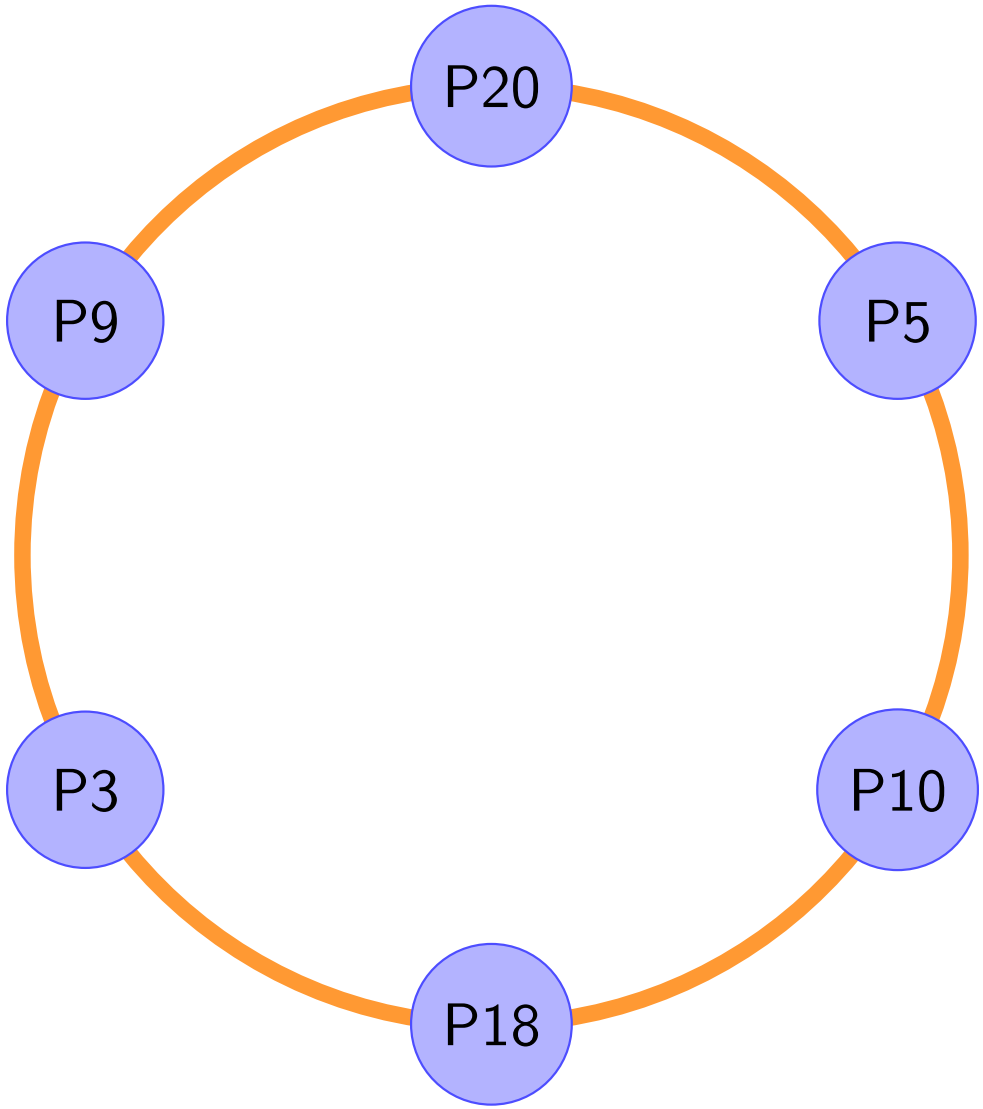
Election Algorithm Overview

- An **election algorithm** is used to choose a unique process to act as a **coordinator**.
- All processes in the system must **agree on the selected coordinator**.
- If the current coordinator retires or fails, a **new election** is initiated.
- A process that initiates an election is said to **call the election**.
- At any time, a process can be:
  - **Participant** – currently involved in an election
  - **Non-participant** – not involved in an election
- Two common election algorithms are:
  - Ring-based Election Algorithm
  - Bully Algorithm

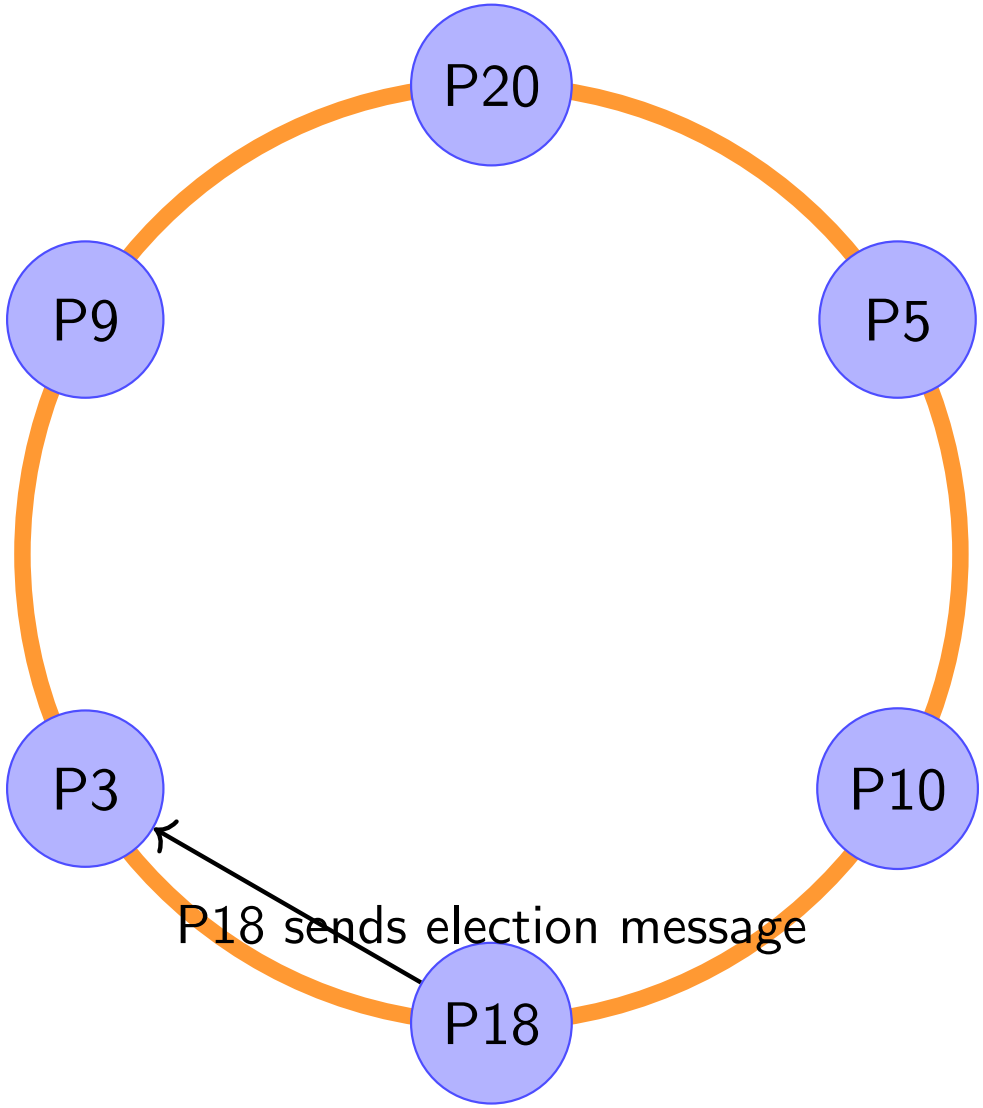
Ring-Based Election Algorithm

- Processes are arranged in a **logical ring**.
- Each process P_i communicates only with $P_{(i+1) \bmod N}$.
- All messages move **clockwise** around the ring.
- Initially, all processes are marked as **non-participants**.
- Any process can start an election by:
  - Marking itself as a participant
  - Sending an **election message** containing its identifier to its neighbour
- When a process receives an election message:
  - If received ID is **greater**, forward the message
  - If received ID is **smaller** and receiver is not a participant, replace it with its own ID and forward
  - If already a participant, it does not forward the message
- If a process receives its **own ID**, it becomes the **coordinator**.
- The coordinator sends an **elected message** around the ring to announce itself.

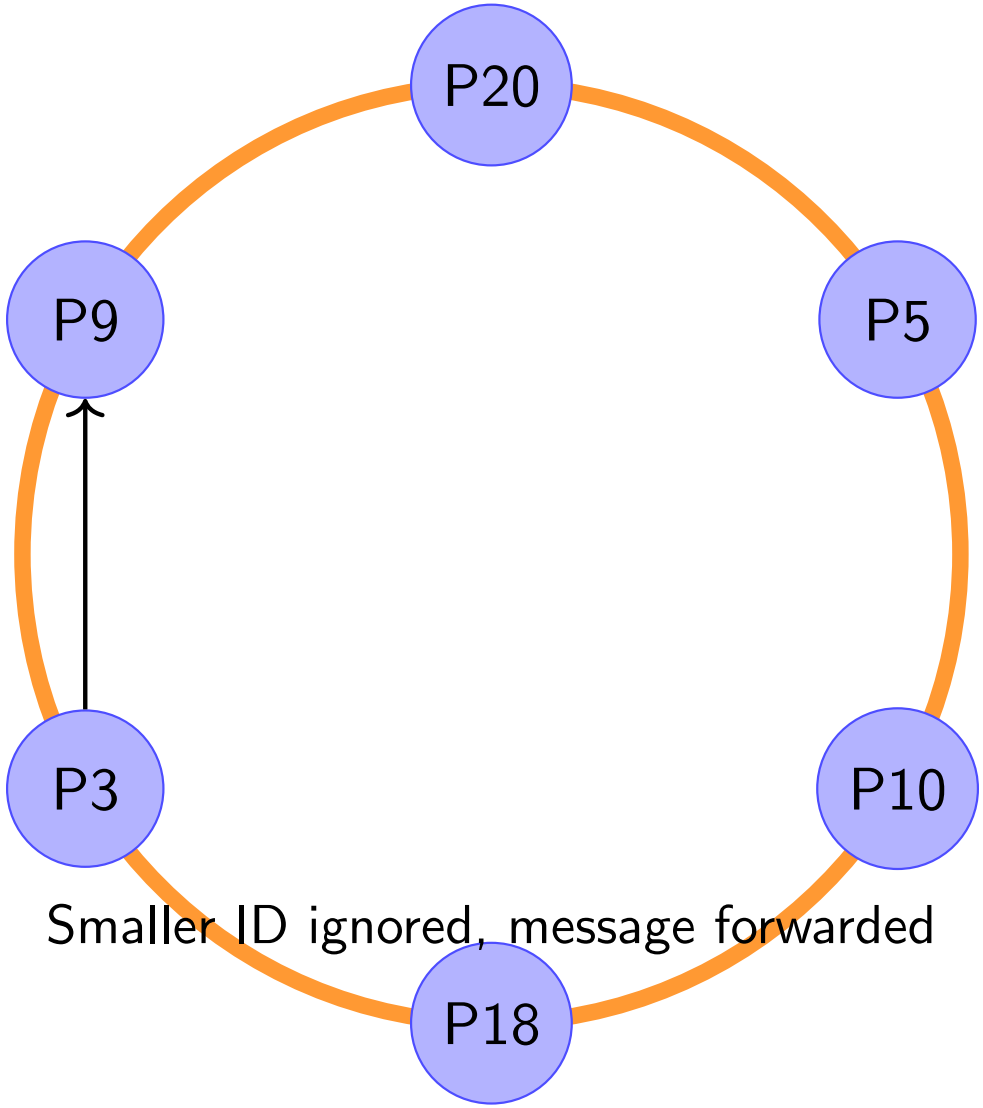
Ring Algorithm – Step 1: Initial State



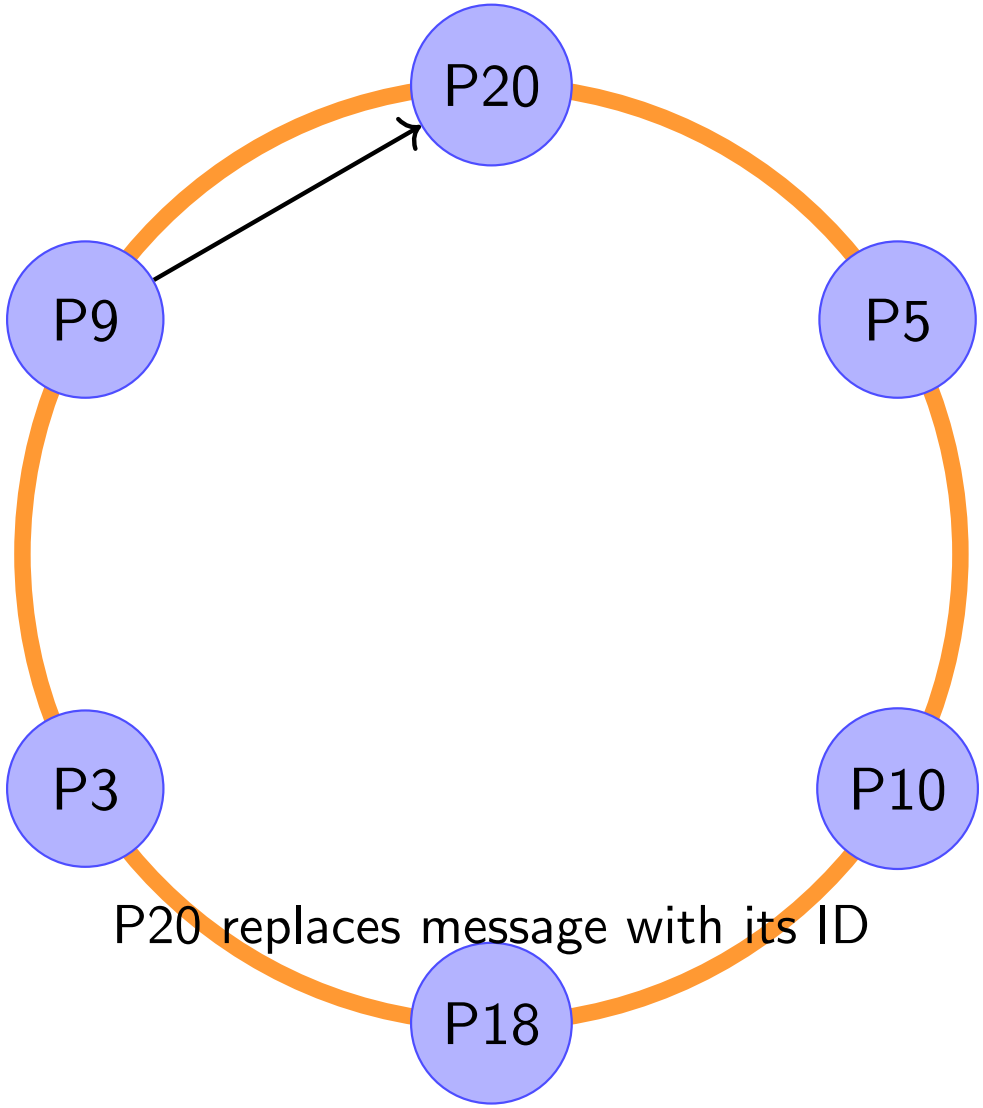
Ring Algorithm – Step 2: Election Initiation



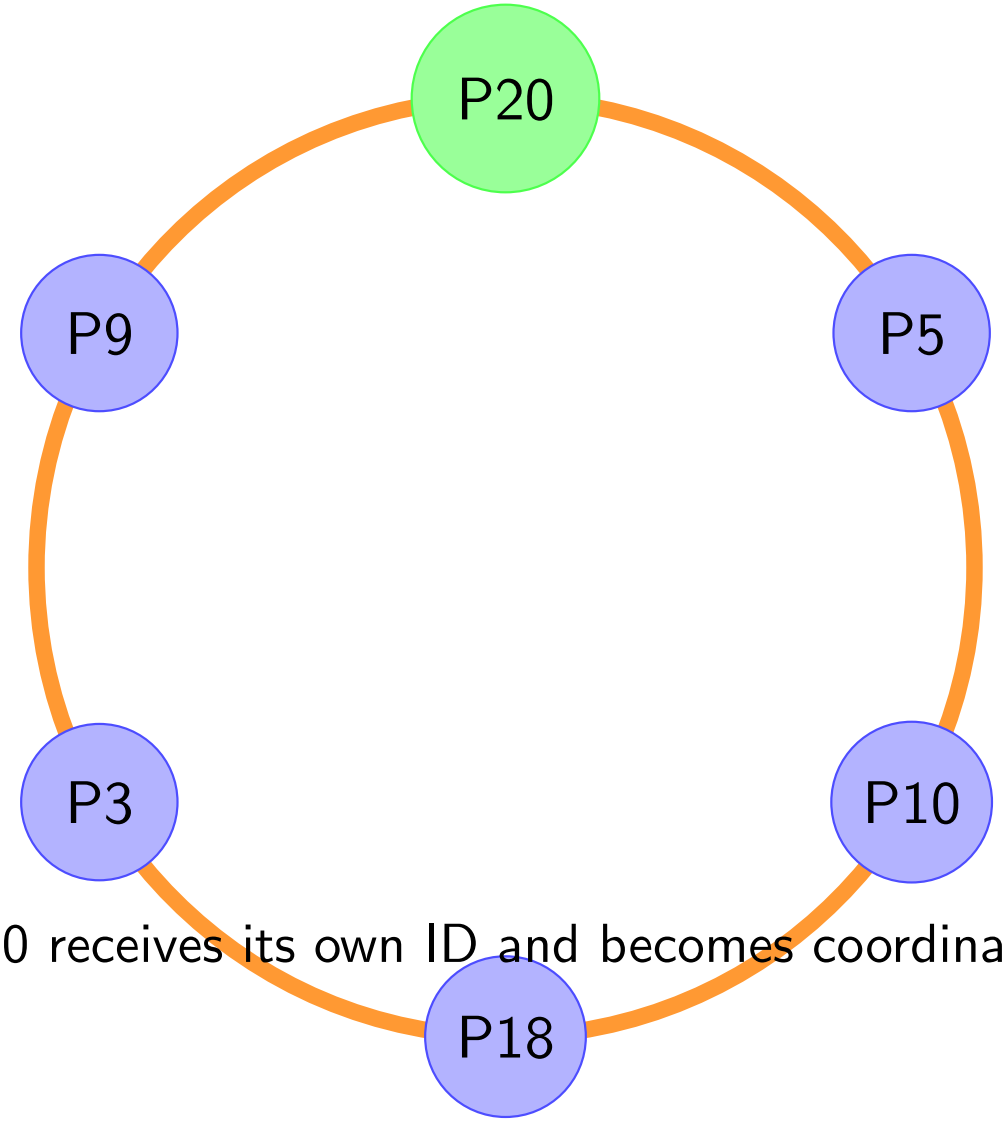
Ring Algorithm – Step 3: ID Comparison



Ring Algorithm – Step 4: Higher ID Replacement

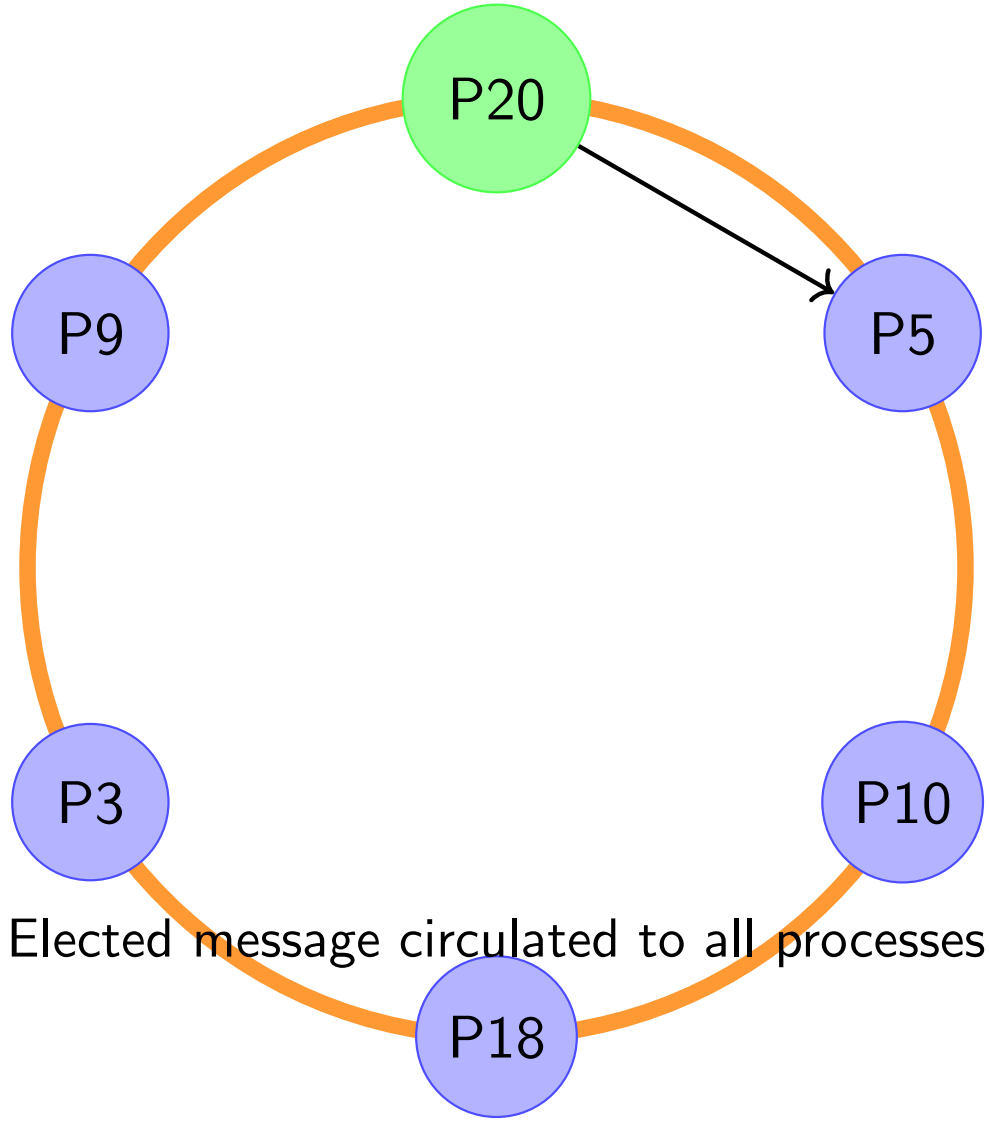


Ring Algorithm – Step 5: Coordinator Election



P20 receives its own ID and becomes coordinator

Ring Algorithm – Step 6: Coordinator Announcement



Elected message circulated to all processes

Thank You