



# Recovery System - Atomic Commits

## 2 phase & 3 Phase Commit Protocols

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# 2 Phase Commit Protocol



# Two Phase Commit (2PC) Protocol

- This is a recovery procedure in multi - database system
- The two-phase commit protocol ensures that all participating resources (database servers) receive and implement the same action (either to commit or to roll back a transaction).
- Every global transaction has a coordinator and one or more participants, defined as follows:
  - The coordinator directs the resolution of the global transaction. It decides whether the global transaction should be committed or stopped.
  - The two-phase commit protocol always assigns the role of coordinator to the current database server. The role of coordinator cannot change during a single transaction.

# Two Phase Commit (2PC) Protocol

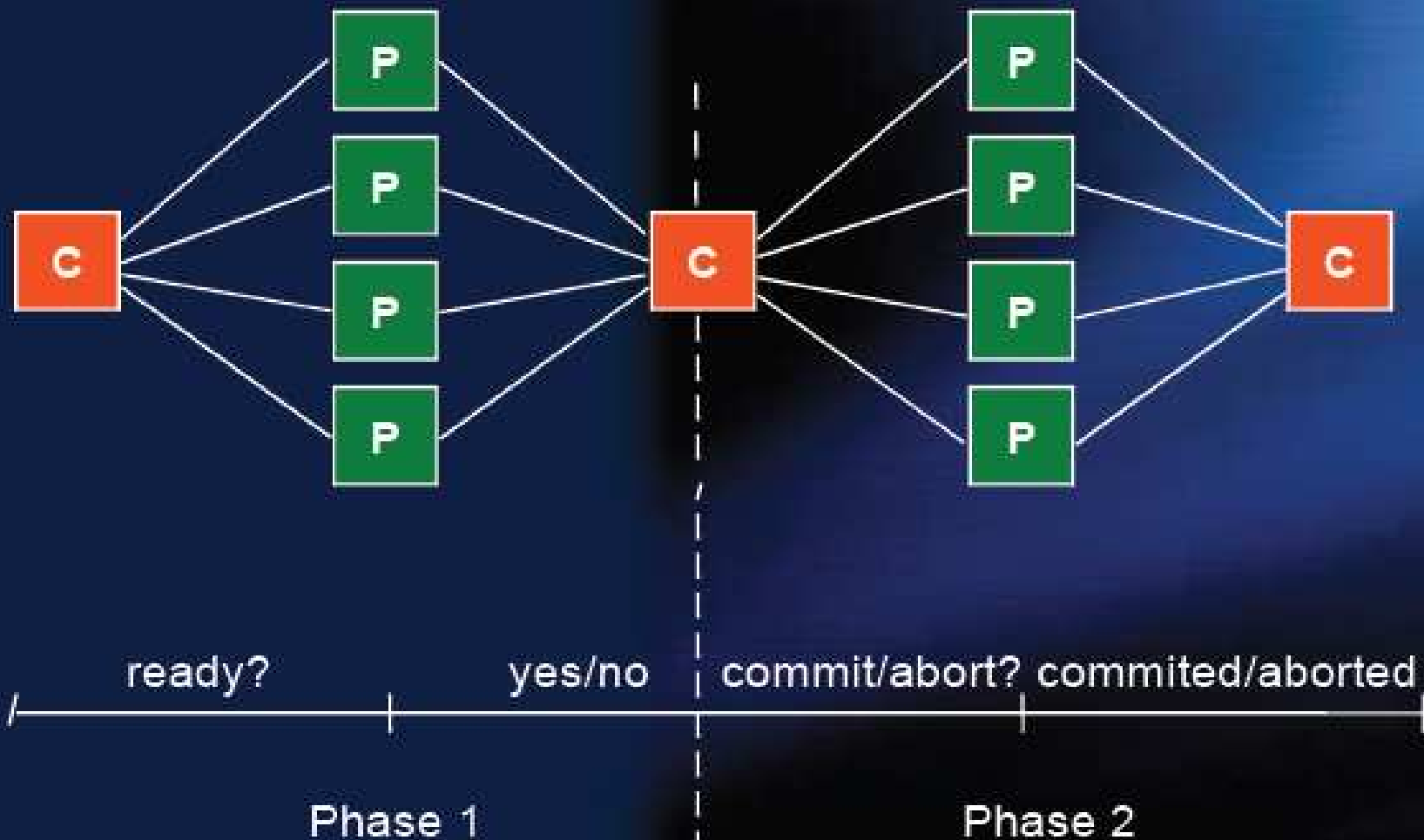
## PHASE - I [Prepare]

- The coordinator instructs all participants to get ready on the transaction
- must force all log records out to its own physical log.
- If forced write is successful, the participants now replies 'YES' to the coordinator; otherwise 'NO'.

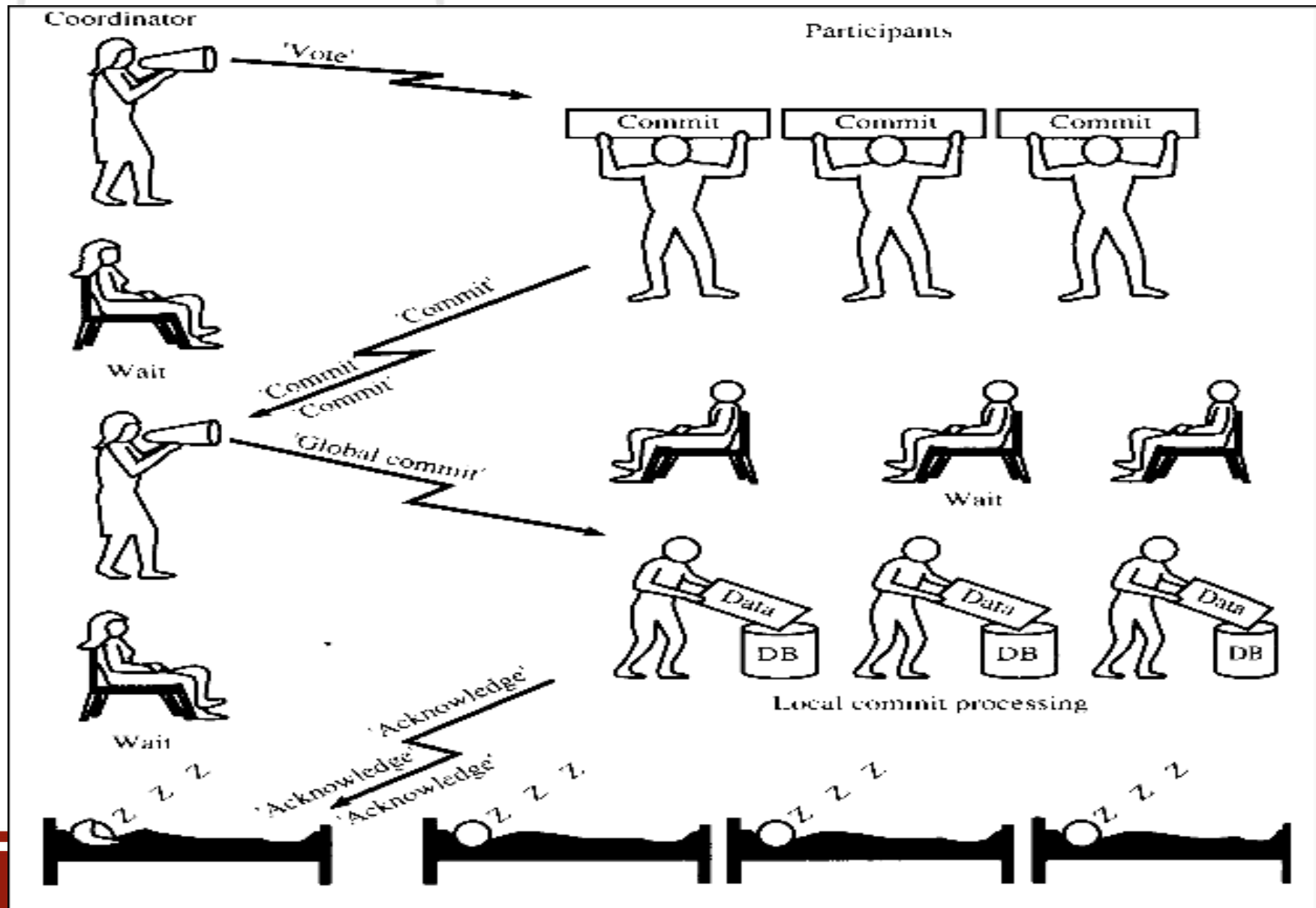
## PHASE - II [Commit]

- Coordinator forces a record to its own physical log, recording its decision.
- If **all** replies were 'YES', decision is 'COMMIT'; if **any** reply was 'NO', the decision is 'ROLLBACK'.
- Coordinator informs each participant of its decision, and each participant must then commit / rollback the transaction locally, as instructed.

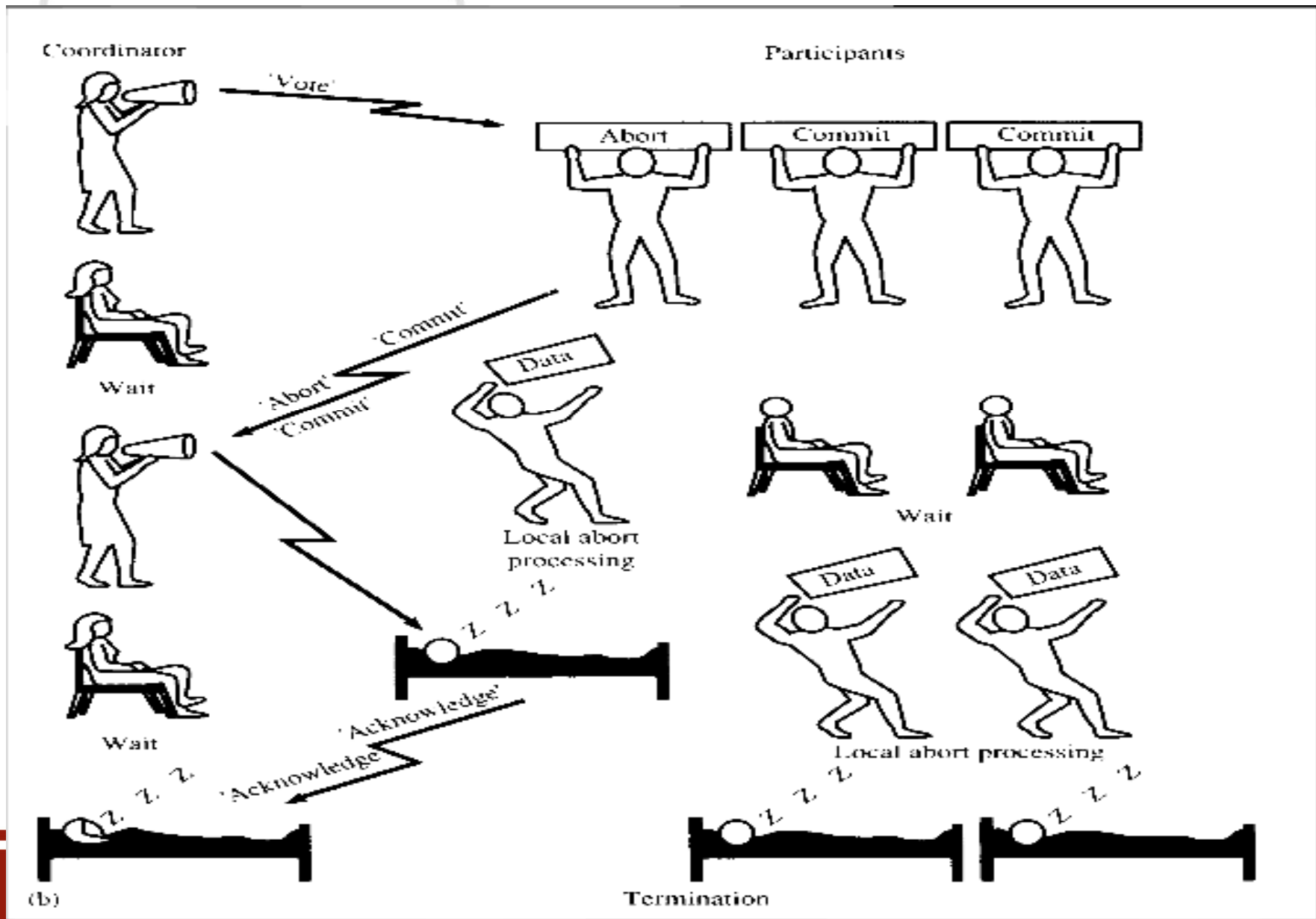
# Two Phase Commit (2PC) Protocol



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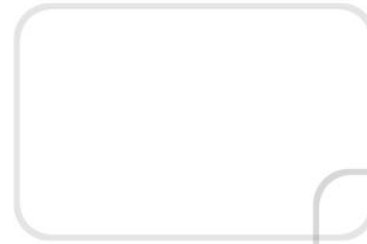
# 3 Phase Commit Protocol

When  
Network partitions Occurs  
or  
Number of failed nodes are  $< K$



# 3 Phase Commit Protocol

- **Participants timeout (Coordinator fails)**
  - – coordinator failed to send “ready” message
    - participants unilaterally abort
  - – coordinator failed to send decision
    - participants send a coordinator a probing message (GetDecision) or
      - sub-transaction can ask its parent in case of nested transaction participants cooperatively obtain a decision (Either commit or abort during recovery)
- **Coordinator timeout (Participant Fails)**
  - – participants failed to send “yes” messages
    - coordinator decides to abort transaction



**Thanks**

