Università
della
Svizzera
italiana

**Facoltà
di scienze
informatiche**

Paxos Project

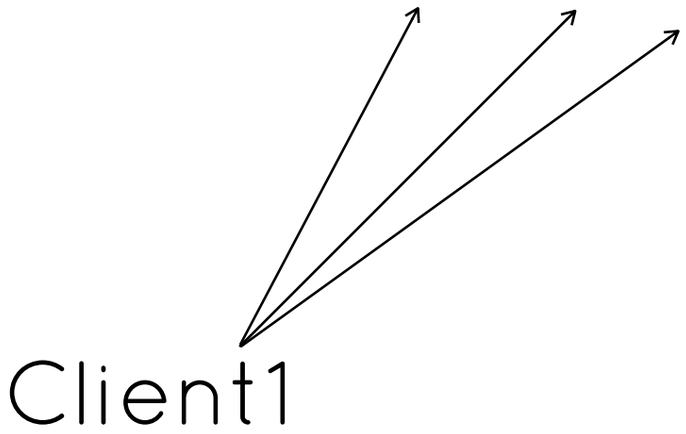
Group Members

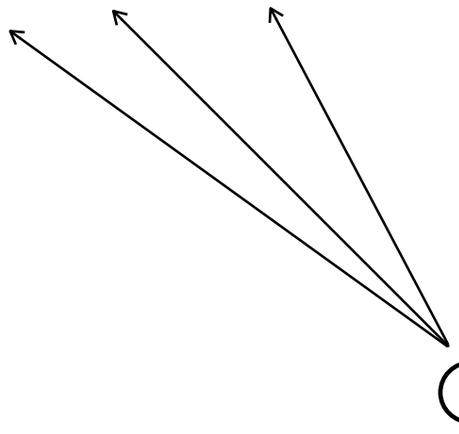
Rui Xin, Haiyang Sun

Overview

- Implemented In Java,2721 LOC
- Library:
  - java.net.DatagramPacket
  - java.net.InetAddress
  - java.net.MulticastSocket
  - java.nio.ByteBuffer
- Work distribution
- Acknowledgement:
  - Diego Ongaro(co-author of raft)
  - *"Paxos lecture (Raft user study)"* on Youtube

First Version





Client1

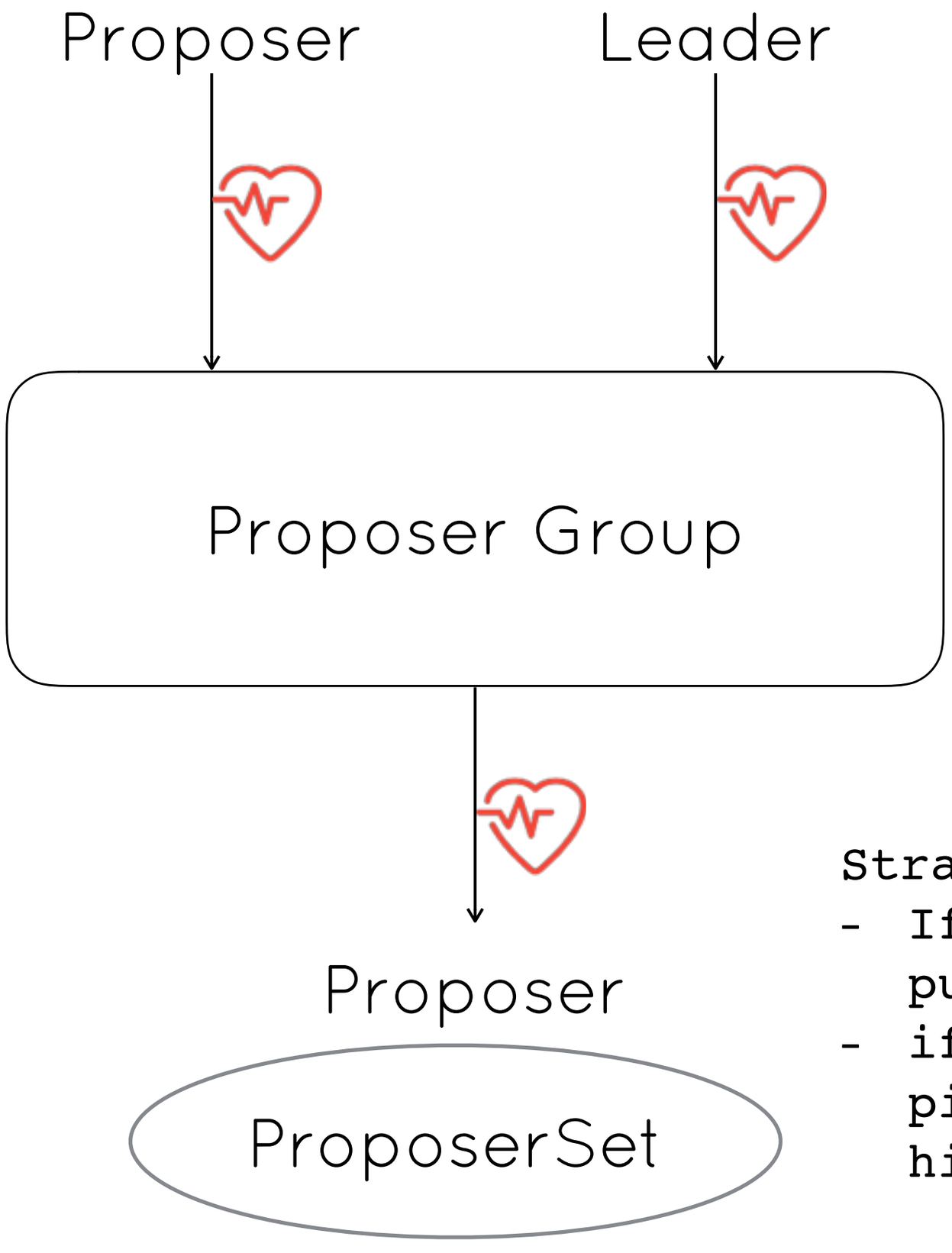
Client2

Exclusive

Index	Value
1	A_1
2	A_2
.....	.....
N	A_N

Index	Value
1	B_1
2	B_2
.....	.....
N	B_N

Leader Election

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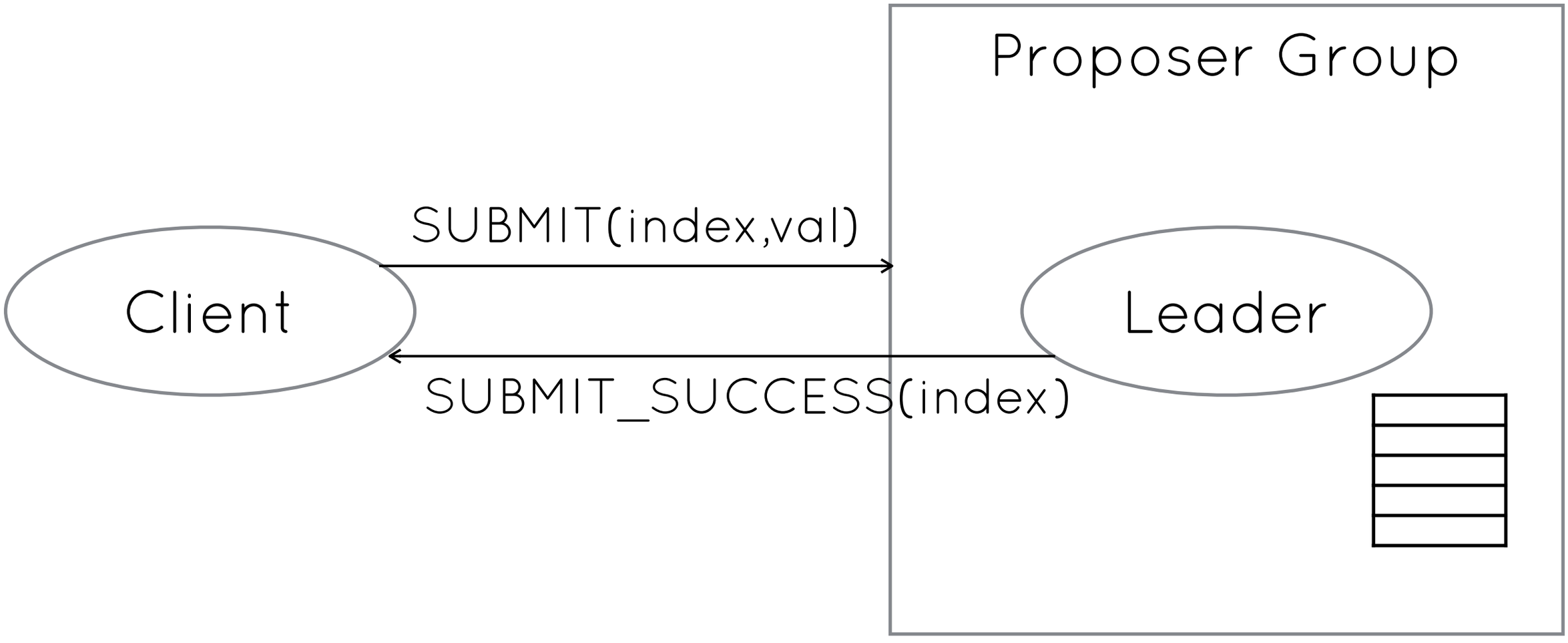
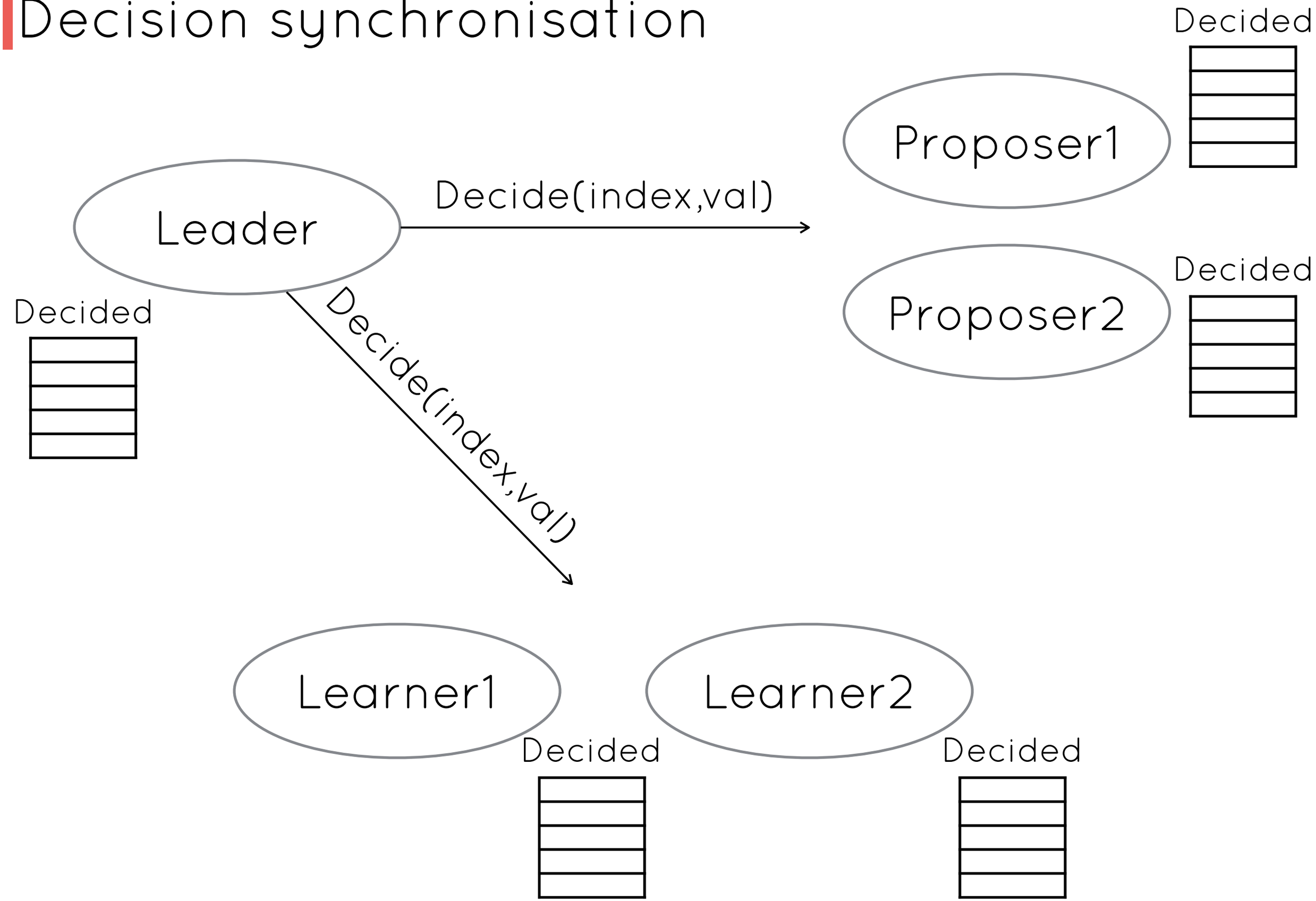
Strategy:
- If recv(ProposerHeartBeat):
  put it into the set
- if !recv(LederHearBeat):
  pick the proposer with the
  highest Id in the set
```

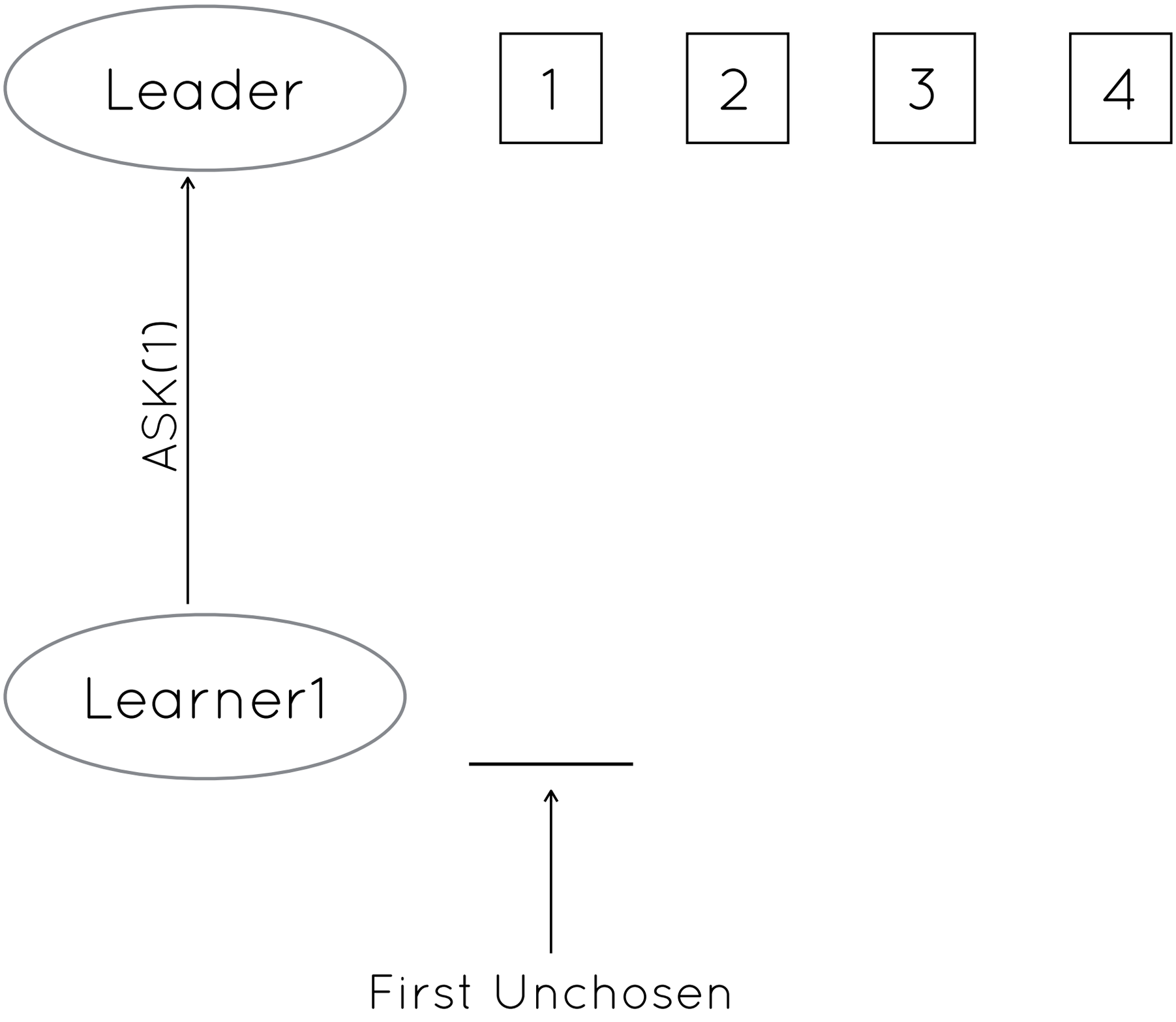
Client submission(non-exclusive)



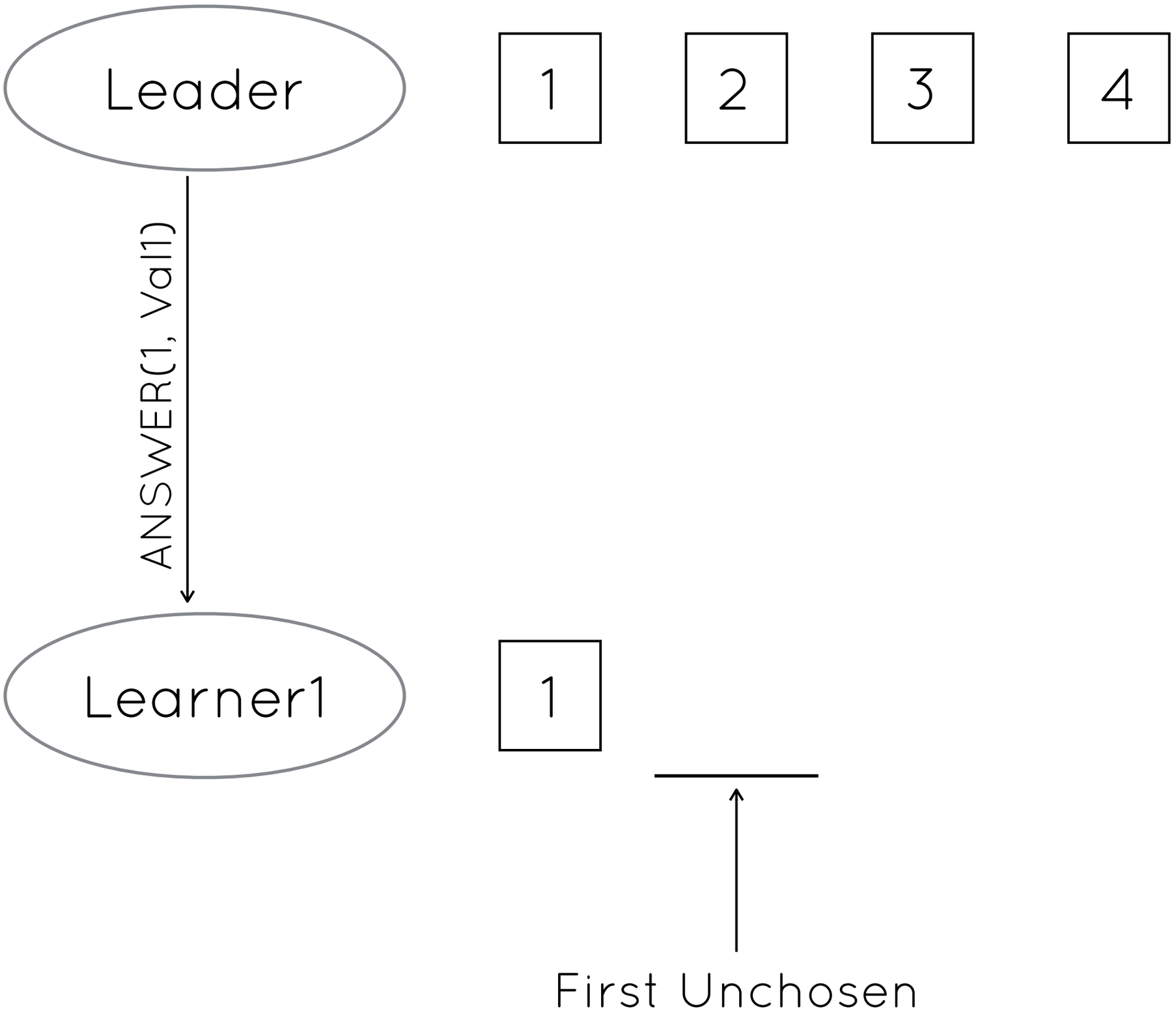
Decision synchronisation



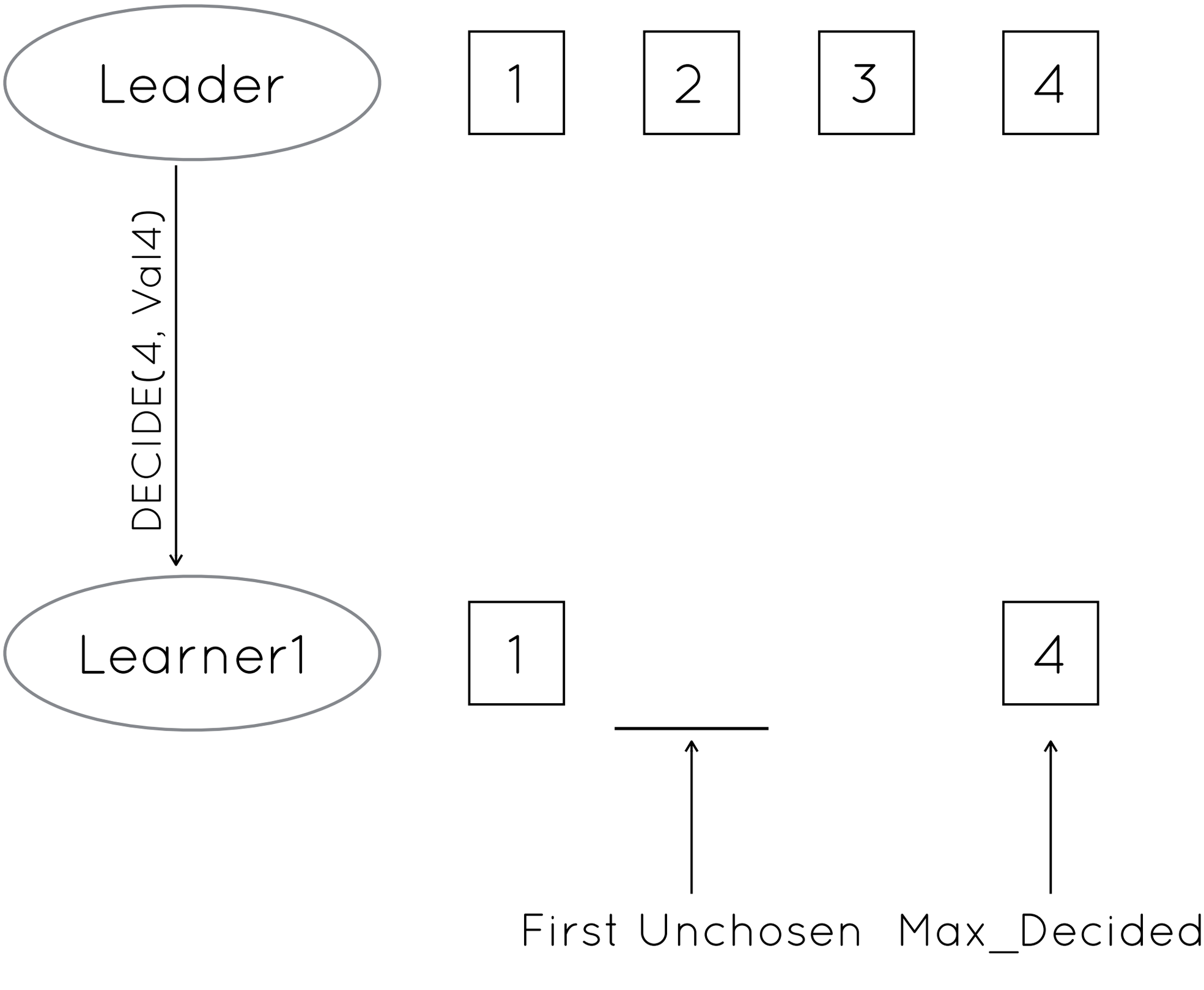
Learner Catchup



Learner Catchup



Learner Catchup



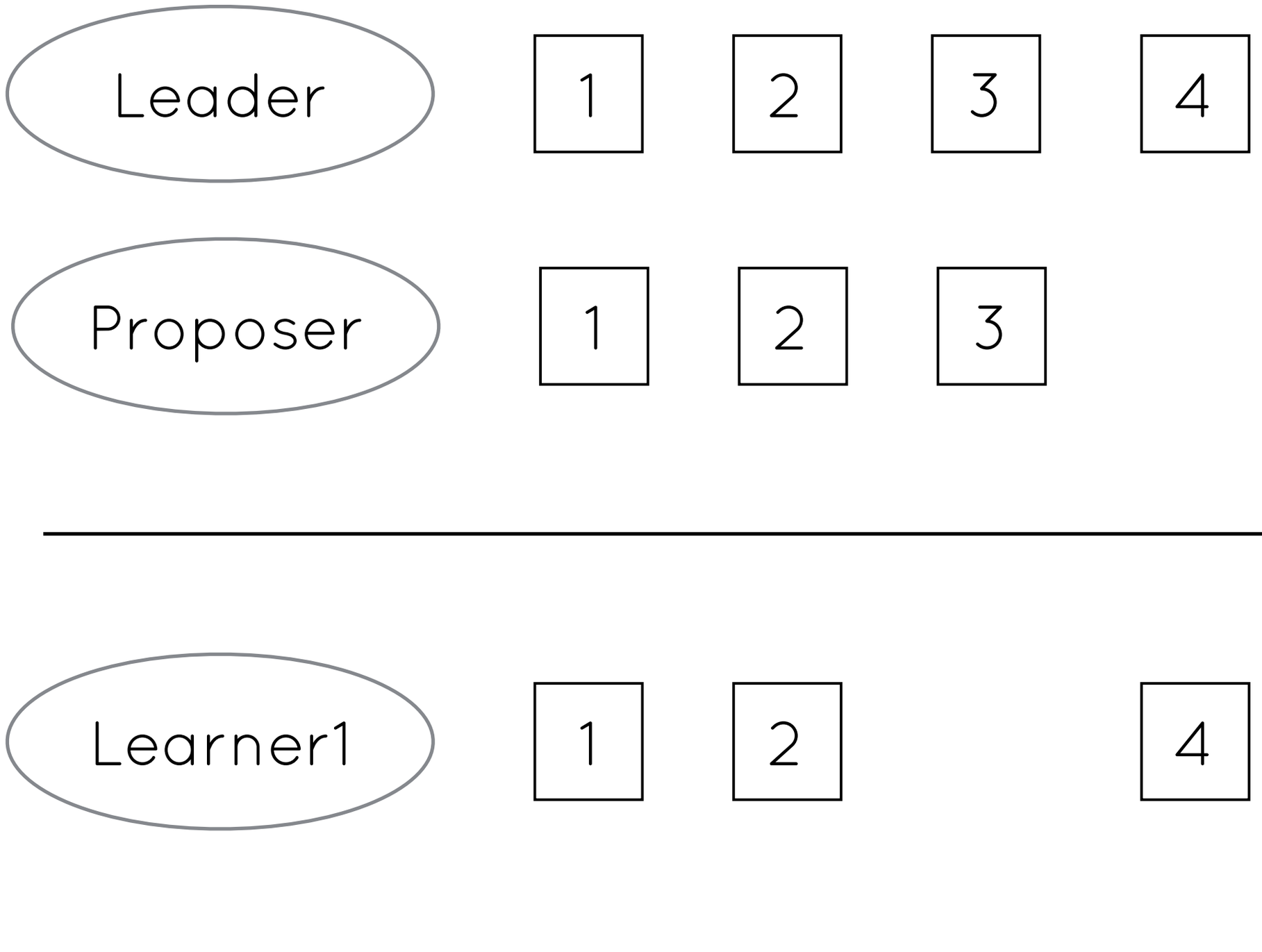
Liveness still cannot be fully guaranteed

Case 1: A proposer joined later becomes a leader

- Assigning later joined proposer lower priority to be leader
- When a proposer firstly joined, act as a learner util up-to-date

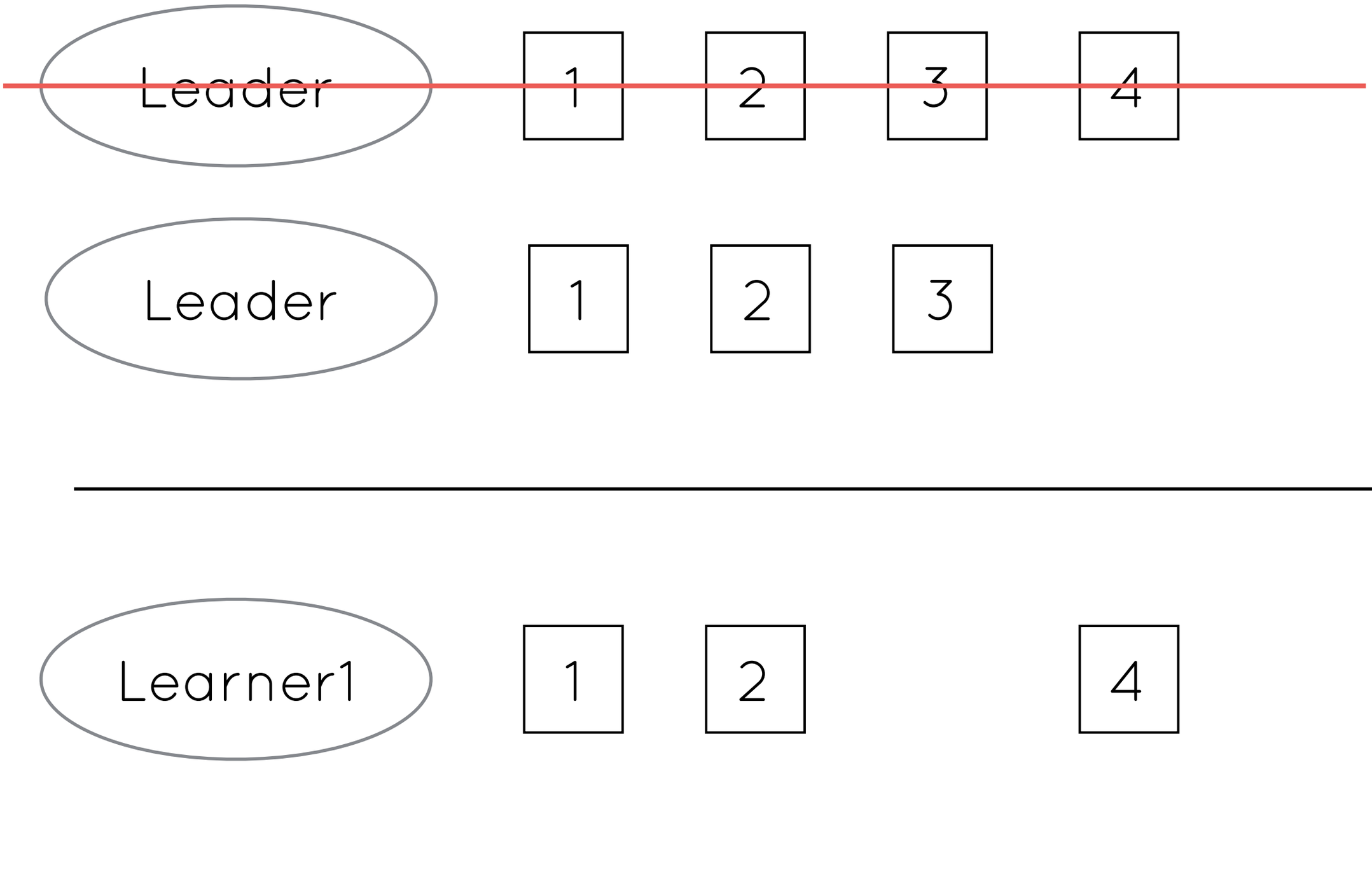
Liveness still cannot be fully guaranteed

Case 2



Liveness still cannot be fully guaranteed

Case 2



Preparation Elimination

Added a flag in PHASE1A, PHASE1B, PHASE2A, PHASE2B

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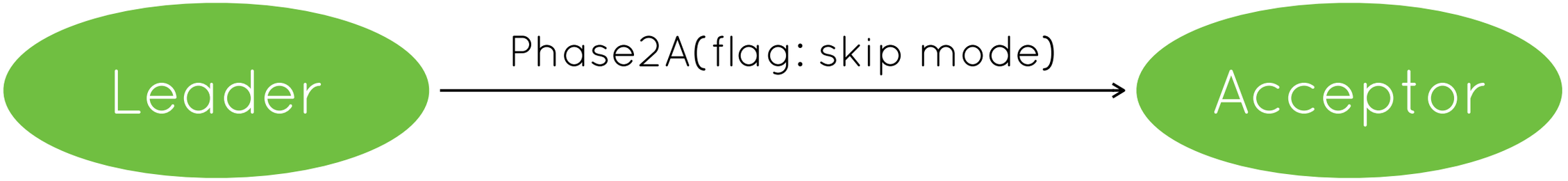
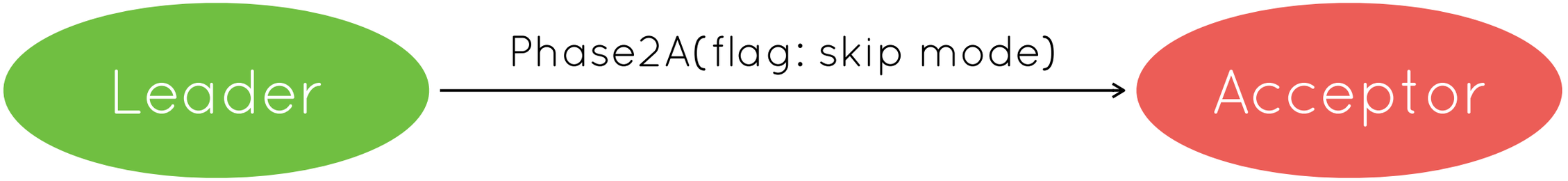


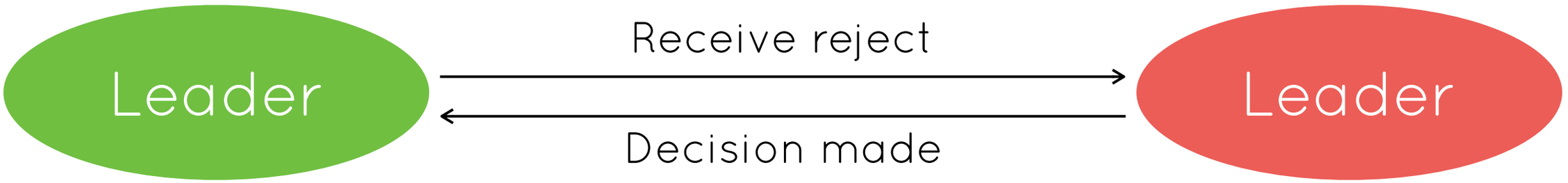
Preparation Elimination

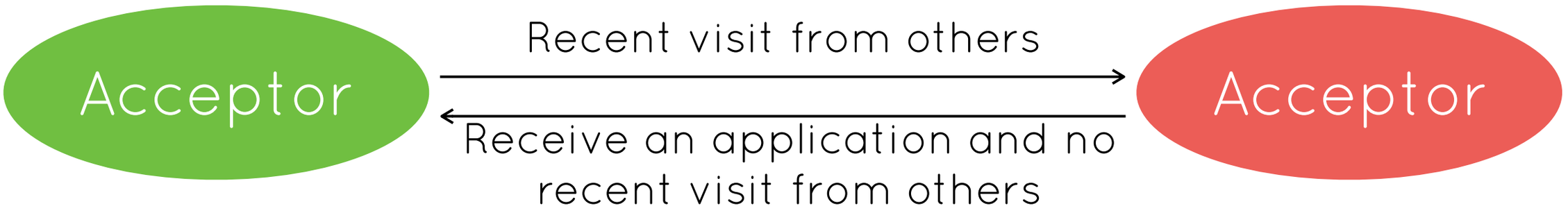
Added a flag in PHASE1A, PHASE1B, PHASE2A, PHASE2B



Preparation Elimination

State machines





Preparation Elimination

A simple proof:

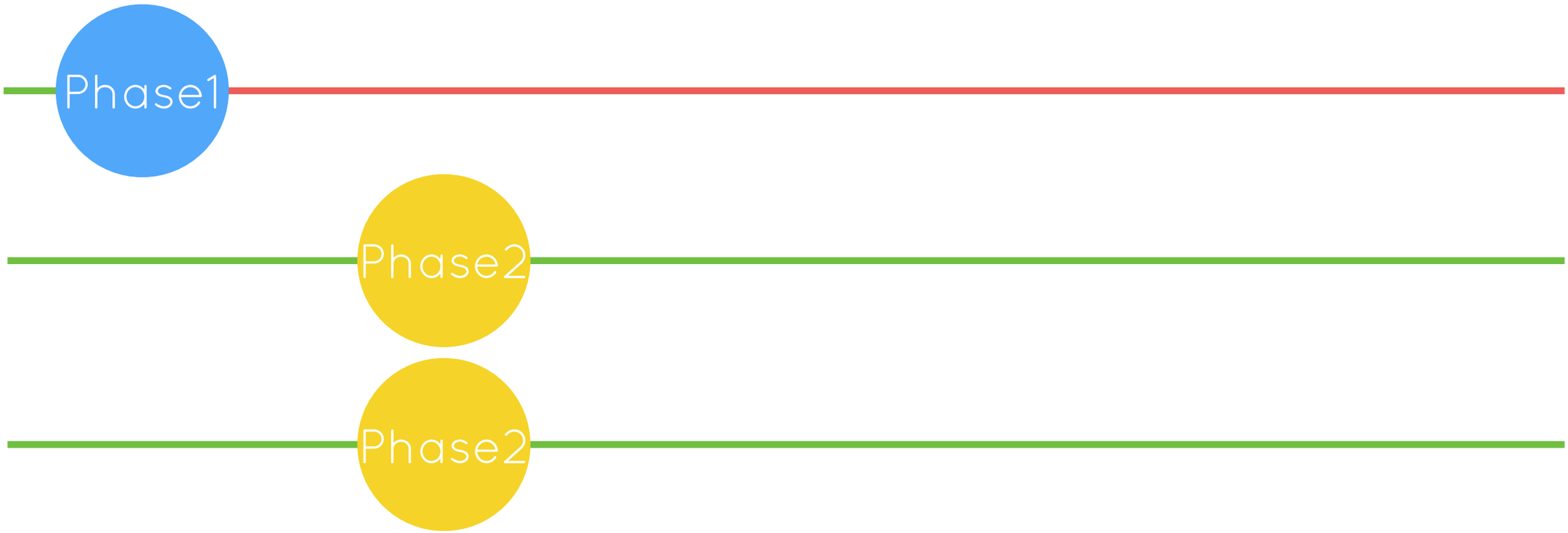
Situation: Leader1 is working without phase1 (e.g leader 1 and a quorum work in “green” mode) while Leader2 cut in.

To be proved: Leader2 has NO possibility to proceed to phase2 before the quorum switch to “red” mode.

Preparation Elimination

A simple proof:

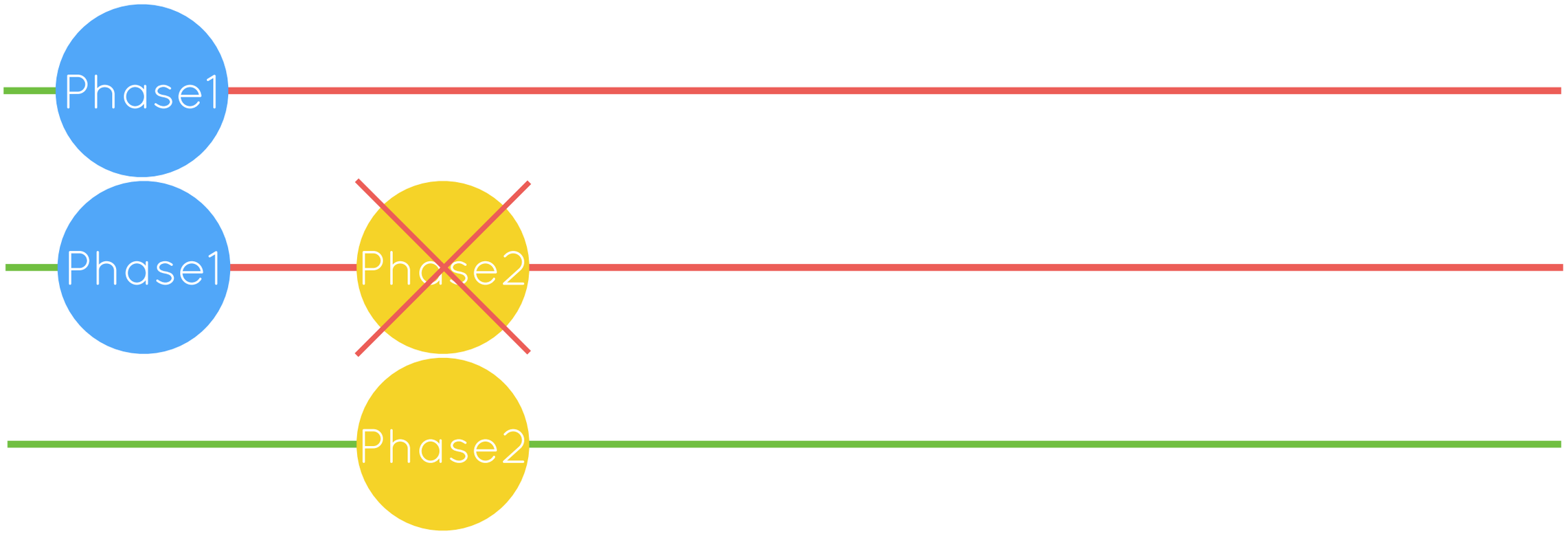
- If Leader2 cannot get a quorum in phase1: It is trivial that it cannot proceed to phase2



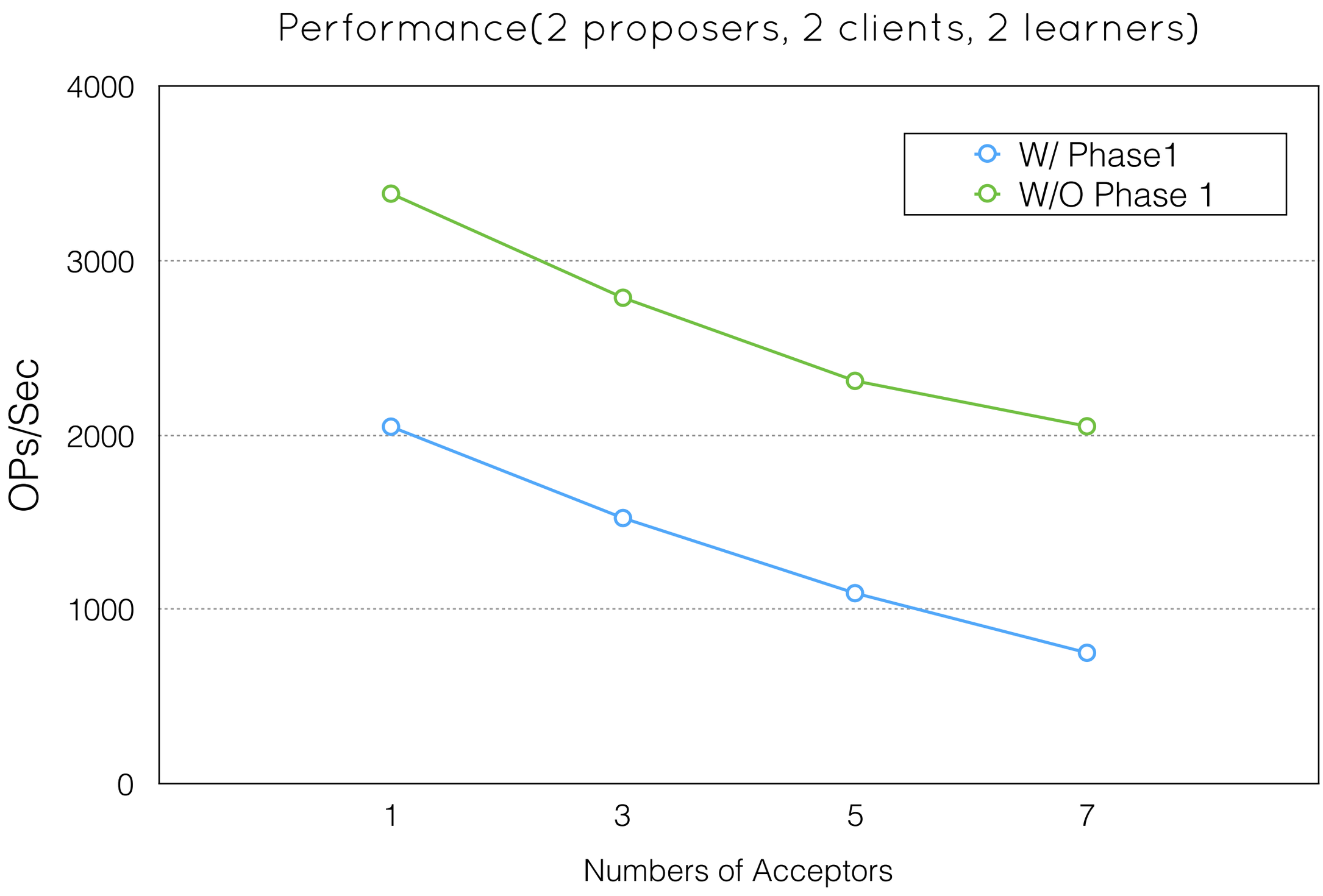
Preparation Elimination

A simple proof:

- If Leader2 gets a quorum in phase1, it means a quorum has been switched to “red” mode, hence Leader1 would NOT receive a quorum to accept.



Performance



Q&A