

# Solution to Exercise 3.1

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EPFL / LPD

December 1, 2011

# Binary Consensus

Some processes *propose* values (0 or 1) and eventually *decide* some values (0 or 1).

**Validity** Every value decided is a value proposed

**Agreement** No two processes decide different value

**Wait-freedom** Every correct process that proposes a value eventually decides a value.

# Binary Consensus from Write-Once Registers

We use a single write-once register  $r$ :

```
upon propose(v)
  r.write(v)
  return r.read()
```

# Binary Consensus from a Queue

We use:

- a queue  $q$  initialized to  $\langle \text{winner}, \text{loser} \rangle$ ,
- array of atomic registers  $r[1..2]$ .

Algorithm for process  $p_i$ ,  $i = 1, 2$ :

```
upon propose(v):  
  r[i].write(v)  
  w := q.deq()  
  if w = winner then return v  
  else return r[3-i].read()
```