

STiDC'07: Exercise 8

December 3, 2007 (updated on January 6, 2008)

1 Problem

Devise an obstruction-free, anonymous algorithm that implements binary consensus using **finite** number of (unbounded) counters.

Reminder: a counter object implements two operations: *inc*, which increments the value of the counter and returns *ok*, and *read*, which returns the current value of the counter.

2 Solution

The following algorithm solves the problem:

uses: C_0, C_1 – counters

upon *propose*(v) **do**

```
    while true do
        ( $x_0, x_1$ )  $\leftarrow$  readCounters()
        if  $x_0 > x_1$  then  $v \leftarrow 0$ 
        else if  $x_1 > x_0$  then  $v \leftarrow 1$ 
        if  $|x_0 - x_1| \geq n$  then return  $v$ 
         $C_v$ .inc()
```

The *readCounters* procedure atomically reads both counters C_0 and C_1 . It can be implemented as follows:

upon *readCounters*() **do**

```
    while true do
         $x_0 \leftarrow C_0$ .read()
         $x_1 \leftarrow C_1$ .read()
         $x'_0 \leftarrow C_0$ .read()
        if  $x_0 = x'_0$  then return ( $x_0, x_1$ )
```