ConcAlgo 2010: Exercise 8

November 29, 2010

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)