Algorithm – Sequentially Consistent Register[*]

Algorithm 1 LT (or SC-ABD)

Implements:

(N, N)-SequentiallyConsistentRegister, **instance** $nnscr$.

Uses:

BestEffortBroadcast, **instance** beb.
PerfectPointToPointLinks, **instance** $pp2p$.

1: **upon event** $\langle\ Init\ \rangle$ **do**
2:     $lt := 0$
3:     $tsv := (0, \bot)$
4:     $rid := 0$
5:     $responses := \emptyset$
6:     $readval := \bot$
7:     $reading := \text{FALSE}$
8: **upon event** $\langle\ nnscr, Read\ \rangle$ **do**
9:     $lt := lit + 1$
10:     $rid := rid + 1$
11:     $reading := \text{TRUE}$
12:     **trigger** $\langle\ beb, Broadcast\ |\ [\text{QUERY}, lt, rid]\ \rangle$
13: **upon event** $\langle\ beb, Deliver\ |\ p, [\text{QUERY}, lt', rid']\ \rangle$ **do**
14:     $lt := \max(lt, lt') + 1$
15:     **trigger** $\langle\ pp2p, Send\ |\ \text{p}, [\text{RESPONSE}, lt, rid', tsv]\ \rangle$

16: **upon event** $\langle\, pp2p, Deliver \mid p, [\text{Response}, lt', rid', tsv'] \,\rangle$ **do**

17:     **if** $rid = rid'$ **then**

18:         $lt := \max(lt, lt') + 1$

19:         $responses := responses \cup \{(tsv', p)\}$

20:         **if** $|responses| > \frac{N}{2}$ **then** $\triangleright$ Where $N = |\Pi|$

21:             $(tsvr, \_) := \max(responses)$

22:             $(\_, readval) := tsvm$

23:             $responses := \emptyset$

24:             $acks := \emptyset$

25:             $rid := rid + 1$

26:             **trigger** $\langle\, beb, Broadcast \mid [\text{Update}, lt, rid, tsvr] \,\rangle$

27: **upon event** $\langle\, nnscr, Write \mid v \,\rangle$ **do**

28:     $lt := lit + 1$

29:     $tsv := ((lt, self), v)$

30:     $rid := rid + 1$

31:     $reading := \text{False}$

32:     **trigger** $\langle\, beb, Broadcast \mid [\text{Update}, lt, rid, tsv] \,\rangle$

33: **upon event** $\langle\, beb, Deliver \mid p, [\text{Update}, lt', rid', tsv'] \,\rangle$ **do**

34:     $lt := \max(lt, lt') + 1$

35:     $tsv := \max(tsv, tsv')$

36:     **trigger** $\langle\, pp2p, Send \mid \text{p}, [\text{Ack}, lt, rid'] \,\rangle$

37: **upon event** $\langle\, pp2p, Deliver \mid p, [\text{Ack}, lt', rid'] \,\rangle$ **do**

38:     **if** $rid = rid'$ **then**

39:         $lt := \max(lt, lt') + 1$

40:         $acks := acks \cup \{p)\}$

41:         **if** $|acks| > \frac{N}{2}$ **then**

42:             $acks := \emptyset$

43:             $rid := rid + 1$

44:             **if** reading **then**

45:                 **trigger** $\langle\, nnscr, ReadResponse \mid readval \,\rangle$

46:             **else**

47:                 **trigger** $\langle\, nnscr, WriteResponse \mid readval \,\rangle$