Homework 7 – Leader Election in asynchronous ring O (n log(n))

Overview:

- Simulation starts by initializing specified number of processors and assigning them an integer id, value and a message buffer. Each processor is running in its own thread.
- Ring topology is created by assigning left and right neighbors to each processor.
- Initially these processors start sending PROBE messages to their left and right neighbor.
- On receiving a PROBE message from its neighbor, the processor will check its own value with the received value. If the value received is smaller, then the message gets swallowed at current processor. If the value received is greater, it sends a REPLY message to the processor.
- A processor on receiving a REPLY message from both its left and right neighbors, enters next phase.
- A leader variable is maintained, which is initially set to true for all processors. If a processor's message getting swallowed at any point in any phase, its leader value is set to false. Processors with leader value true enters next phase. These processors will send PROBE message to their left and right neighbors. The hop count is incremented in every phase.
- At end the only processor with leader value equal to true will be elected as leader.

Input:

Total number of processors and their corresponding integer values.

Output:

Enter number of processors:
7
Enter value for processor P0 :
10
Enter value for processor P1 :
44
Enter value for processor P2 :
2
Enter value for processor P3 :
50
Enter value for processor P4 :

6
Enter value for processor P5 :
77
Enter value for processor P6 :
12
Ring Topology

-->(Id: 0, Value: 10)-->-->(Id: 1, Value: 44)-->-->(Id: 2, Value: 2)-->-->(Id: 3, Value: 50)-->-->(Id: 4, Value: 6)-->-->(Id: 5, Value: 77)-->-->(Id: 6, Value: 12)-->

Processor 1 sending probe to Processor 2
Processor 0 sending probe to Processor 1
Processor 5 sending probe to Processor 6
Processor 2 sending probe to Processor 3
Processor 3 sending probe to Processor 4
Processor 4 sending probe to Processor 5
Processor 6 sending probe to Processor 0
Processor 6 received probe from Processor 5
Processor 1 received probe from Processor 0
Message received from Processor 0 is swallowed at Processor 1
Processor 0 sending probe to Processor 6
Processor 6 received probe from Processor 0
Message received from Processor 0 is swallowed at Processor 6
Processor 2 received probe from Processor 1
Processor 3 received probe from Processor 2
Processor 0 received probe from Processor 6
Processor 4 received probe from Processor 3
Processor 0 sending reply to Processor 6
Message received from Processor 2 is swallowed at Processor 3
Processor 2 sending probe to Processor 1
Processor 2 sending reply to Processor 1
Processor 5 received probe from Processor 4
Processor 6 sending reply to Processor 5
Message received from Processor 4 is swallowed at Processor 5
Processor 1 received reply message from 1

Processor 1 received probe from Processor 2
Message received from Processor 2 is swallowed at Processor 1
Processor 6 received reply message from 6
Processor 6 sending probe to Processor 5
Processor 5 received probe from Processor 6
Message received from Processor 6 is swallowed at Processor 5
Processor 4 sending reply to Processor 3
Processor 3 received reply message from 3
Processor 3 sending probe to Processor 2
Processor 2 received probe from Processor 3
Processor 2 sending reply to Processor 3
Processor 3 received reply message from 3
----------Phase 0 Winner: Processor 3 with value: 50
Processor 4 received probe from Processor 3
Processor 4 sending probe to Processor 5
Processor 5 received probe from Processor 3
Message received from Processor 3 is swallowed at Processor 5
Processor 2 received probe from Processor 3
Processor 2 sending probe to Processor 1
Processor 1 received probe from Processor 3
Processor 1 sending probe to Processor 0
Processor 0 received probe from Processor 1
Processor 0 sending reply to Processor 1
Processor 1 received reply message from 1
----------Phase 0 Winner: Processor 1 with value: 44
Processor 2 received probe from Processor 1
Processor 2 sending probe to Processor 3
Processor 3 received probe from Processor 1
Message received from Processor 1 is swallowed at Processor 3
Processor 0 received probe from Processor 1
Processor 0 sending probe to Processor 6
Processor 6 received probe from Processor 1
Processor 4 sending probe to Processor 3
Processor 5 received reply message from 5
Processor 5 sending probe to Processor 4

Processor 4 received probe from Processor 5
Processor 4 sending reply to Processor 5
Processor 5 received reply message from 5
----------Phase 0 Winner: Processor 5 with value: 77
Processor 6 received probe from Processor 5
Processor 6 sending probe to Processor 0
Processor 0 received probe from Processor 5
Processor 4 received probe from Processor 5
Processor 4 sending probe to Processor 3
Processor 3 received probe from Processor 5
Processor 3 received probe from Processor 4
Message received from Processor 4 is swallowed at Processor 3

Processor P5 with value 77 has been elected as leader.
