

Network Algorithms: Exercise 11

Mutual exclusion

Dr. Stefan Schmid, Arne Ludwig, Srivatsan Ravi



Algorithm 1 Solving mutual exclusion among n processes p_1, \dots, p_n ; code for p_i

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1: Shared variables:
2:   atomic register  $LA_i$ , initially 0 for each process  $p_i$ 
3:   atomic register  $r_i$ , initially false for each process  $p_i$ 

4: Code executed by  $p_i$ :
5:   Entry Section code
6:   write( $r_i, true$ )
7:   write( $LA_i, \max(LA_0, \dots, LA_{n-1}) + 1$ )
8:   write( $r_i, false$ )
9:   for all  $j = 1 \dots n$  do
10:    await  $r_j = false$ 
11:    await  $LA_j = 0 \vee (LA_j, j) \geq (LA_i, i)$ 
12:   Enter Critical section
13:   Exit section code
14:    $LA_i = 0$ 
```

Does the above algorithm ensure mutual exclusion? If not, construct an execution where there exist two processes that are inside the critical section at the same time (50 points).