Quelques résultats sur les registres Multi Ecrivains Multi Lecteurs
Some results with MWMR registers

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Abstract

What is the number of registers required to solve a task? Many years ago, Ellen and al. have proved a lower bound of square root of n registers to (obstruction free) solve the consensus, but today there is no known consensus algorithm using less than n registers. In a system of n processes, if each process has its own SWMR register, it is possible to emulate any number of registers, but what of tasks can be solved with less than n registers?

Before considering this question, what's happens when we only have MWMR registers? A trivial way may be to assign each process one MWMR: given an array C of MWMR registers, C[i] will be assigned to process i. But if the n processes have ids drawn from a very large set of N identifiers, the size of C depends on N not on n. Renaming algorithms may help but they use a non linear (on n) number of MWMR registers.

We give a solution without renaming that implements for each process a SWMR register using only n MWMR registers. This implementation is only non-blocking, but we get with 2(n-1) MWMR a wait-free implementation. Moreover we prove that n is a lower bound to such implementation. We also prove that n MWMR registers are sufficient to solve any wait-free task solvable with any number of (MWMR or SWMR) registers.

If the number of MWMR is less than n, we prove that some tasks may nevertheless been (obstruction-free) solved. For example, we prove that 2 registers are necessary and sufficient to (Obstruction-Free) solve the set-agreement problem.

A recent extension to the adaptive case has been made jointly with L. Lamport.