Documentation Laboratory 7

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1. Given a sequence of n numbers, compute the sums of the first k numbers, for each k between 1 and n. Parallelize the computations, to optimize for low latency on a large number of processors. Use at most 2*n additions, but no more than 2*log(n) additions on each computation path from inputs to an output. Example: if the input sequence is 1 5 2 4, then the output should be 1 6 8 12.

Algorithm

The solution of this problem is that each thread increase the sum of first k elements on the i-k position.
If the number of active threads is less than the number of total threads, we increase the number of threads working on the solution array, otherwise, we just increase the partial sum.

Synchronization method

We use mutex for lock individual elements of the resulting array of first k sums. After their execution the threads are joined.

Performance

Number of elements	Number of threads	Time (ms)
10	5	0.558881
10	10	0.775454
50	10	0.879922
50	25	1.67257
50	50	3.41853